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LAND POLICIES AND THEIR OUTCOMES

Edited by Gregory K. Ingram and Yu-Hung Hong

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The Efficiency and Equity of Tiebout in the United States: Taxes, Services, and Property Values

Thomas J. Nechyba

In his seminal article, Charles M. Tiebout (1956) specified seven conditions under which local public goods "markets" are analogous to decentralized, competitive private markets that operate efficiently. The decentralized markets he had in mind are ones in which small local governments (analogous to small firms in a competitive market) provide bundles of public goods and taxes. Just as consumer choices provide the disciplining force toward efficiency in typical private markets, residential choices can provide a similar disciplining force in such local public goods markets. Local government planners who operate inefficiently or seek excessive political rents will be driven out of these markets, the argument goes, just as firms in competitive private markets are driven out if they do not operate efficiently or if they seek excessive economic profits. Furthermore, if particular household tastes are not met adequately by existing local governments, new jurisdictions may form to attract such residents with "better" packages of services and taxes, just as new firms form in private markets to take advantage of the heterogeneity in consumer tastes.

The resulting Tiebout theorem can thus be viewed as playing a role in certain public goods markets analogous to the role played by the famous first welfare theorem in understanding private goods markets. This welfare theorem, hinted at in the work of Adam Smith and fully formalized by Arrow, Debreu, and McKenzie in the 1950s (Arrow and Debreu 1954; McKenzie 1959), starkly specifies the conditions under which competition leads to efficiency in private markets and in the process has crisply defined under what circumstances governments or other nonmarket institutions might in fact play an efficiency-enhancing role. The "perfect" markets of the first welfare theorem assume away real-world facts such as externalities, imperfect competition, and asymmetric information, with subdisciplines such as public

economics, labor economics, and industrial organization then taking up the task of investigating how government intervention (or other nonmarket institutions) can enhance the efficiency of markets when these facts of life come into play. No one today argues that markets in general are "perfect" in the way outlined in the first welfare theorem, but at the same time few would begin to deny the importance of the fundamental insights of that theorem in shaping views of how markets, governments, and civil society institutions can optimally interact in a world riddled with externalities, imperfect competition, and asymmetric information.

In a very similar fashion, it is difficult to argue that the fundamental insights of the Tiebout theorem might not play an important role in local economies, just as it is difficult to argue that the stark conditions specified by Tiebout are ever fully satisfied in this complicated world. It makes little sense, then, to argue about whether the Tiebout theorem "holds" in the real world. The more fundamental question is whether and under what conditions the disciplining force of household mobility rises to the importance assigned to it by the Tiebout theorem—and how societies can deal effectively with the complications that arise from the fact that the underlying conditions of the Tiebout theorem are often violated. The aim of this chapter is to highlight the theoretical and empirical evidence that bears on this fundamental issue.

In the process, it argues that two sets of considerations are particularly important and are, once again, quite similar to the considerations that guide thinking about the interactions of markets and nonmarket institutions in general. The first such consideration centers around *efficiency* and thus relates directly to the central issue that concerned Tiebout in his original article. Although he did not work out the formal details in that article, Tiebout gave the beginnings of a description of the underlying conditions needed for the efficiency of local public goods markets and therefore provided a model for empirical work to investigate the extent to which these conditions hold and for theoretical research to investigate potential remedies for real-world inefficiencies. The second consideration, not addressed by Tiebout, centers around notions of *equity*—that is, concerns that, even if local economies operate efficiently, the Tiebout mechanism may result in fundamental inequities. This point again is analogous to how one thinks about private markets in which, even when the conditions of the first welfare theorem are fully satisfied and thus no efficiency-enhancing role exists for governments or civil society institutions, distributions of endowments in an economy might be such that the resulting levels of inequality are disturbing and in need of a remedy.

The remainder of this chapter will proceed as follows. It begins by examining the *efficiency* properties of the Tiebout model and argues that the theoretical literature has verified important elements of Tiebout's original insight, while uncovering particular limitations that arise from the inclusion of a spatial dimension to the model. The inclusion of this spatial dimension requires careful consideration of how land and housing markets interact with Tiebout mobility of households and how, in any empirically relevant context, this interaction gives rise to the capitalization of public services and taxes into land values. Such capitalization, as we shall see, suggests some limits to Tiebout's efficiency hypothesis. This chapter also highlights the limits imposed by local political factors, by the existence of intercommunity spillovers, and by the externalities arising from social interactions before

it proceeds to a related discussion of the *equity* properties of the Tiebout model. Meanwhile, the chapter highlights the notion of "categorical equity" and its importance within Tiebout economies such as those found in the United States—particularly as it relates to circumstances in which social interactions matter such as in the provision of local public education. The chapter concludes by suggesting that real progress in understanding Tiebout forces in the United States will depend on merging the Tiebout literature with structural urban economics models and that such a merging holds much potential for gaining deeper insights into the efficiency and equity concerns that arise in U.S. metropolitan areas as well as ways in which these concerns might be addressed.

Efficiency and the Tiebout Model

Anyone focusing solely on the decade that followed Tiebout's 1956 article would have the impression that the piece had little influence on the way public and urban economists thought about communities and cities. But beginning in the mid-1960s, Tiebout's insights began to catch the attention of both theorists and empiricists. Most notably, Buchanan (1965) developed an initial theory of clubs in which consumers self-select into clubs that provide public services, and Oates (1969) conducted a seminal empirical investigation into the evidence for the voting with the feet phenomenon that Tiebout had in mind. Together, these pieces began to form the basis for an explosion of theoretical and empirical interest in the Tiebout model, each taking its place among the most-cited papers in public economics. At the same time, as emphasized toward the end of this chapter, this Tiebout literature remains too disconnected from important aspects of urban economics.

CLUBS, COMMUNITIES, AND CAPITALIZATION

The theoretical Tiebout literature over the past decades can be divided into two main groups: (1) models of club competition, and (2) models of community competition. The defining difference between these groups arises from the spatial dimension that defines communities but not clubs—a dimension that in some form includes models of housing and land. Some recent models have begun to merge aspects of clubs and communities; one example is models of school markets that contain competition between spatially defined public school districts and private schools that are modeled more as clubs, a topic addressed later in this chapter. The addition of land and housing to club models has given rise to complexities that were perhaps not originally envisioned by Tiebout—complexities that relate closely to the phenomenon of the capitalization of the value of local taxes and services into land and housing prices.

Competition Between Clubs At the risk of oversimplifying the extensive set of results in the club literature, the following is a reasonably accurate characterization of the types of results that have emerged in different models: as long as profit-maximizing clubs are relatively small (and thus not subject to large economies of scale), so long as club goods do not confer benefits or costs outside clubs, and as long as clubs operate in a competitive environment, the resulting equilibria are

indeed efficient as hypothesized by Tiebout.[1] Models in this literature have treated different cases of "crowding" in clubs. In some cases, there is "crowding in consumption" in the sense that it becomes increasingly difficult for a larger number of club members to share a club good (such as a swimming pool), and in other cases there is "crowding in production" in the sense that it becomes increasingly difficult to provide a particular level of public service as the club membership increases. Tiebout's insight that consumer choice between clubs can result in the efficient provision of nonprivate goods has therefore largely withstood rigorous theoretical scrutiny. What club models do not address, however, is the additional crowding that occurs in communities tied to land.

Turning Clubs into Communities Tied to Land Land is a unique type of private good that has proven challenging to model (Berliant 1985), and its fundamental role in community competition places limits on the extent to which a broad efficiency result can be obtained when it is modeled in realistic ways. The basic issue became clear early on in the literature when Edel and Sclar (1974) challenged Oates's (1969) empirical evidence in favor of the Tiebout hypothesis on theoretical grounds. Oates in essence demonstrated that households indeed vote with their feet when choosing communities, because housing prices appear to capitalize tax and spending patterns by local governments. Put differently, Oates demonstrated that housing prices are higher, all else being equal, when local governments provide better public services, and are lower, all else being equal, when local governments charge higher taxes. The only way this result can emerge is if households indeed pay attention to local government spending and tax policies when choosing where to live. Oates interpreted this finding as evidence, which has been verified in countless capitalization studies that favored Tiebout's hypothesis.[2]

Edel and Sclar, however, pointed out that the very finding of capitalization in Oates's paper was, in some sense, evidence *against* Tiebout's larger hypothesis that local government competition results in efficiency. If a particular community has higher housing prices because of the better mix of public goods and taxes it offers, there should be room in the market for another community to form and offer a similar mix of services and taxes, because people are obviously willing to pay extra to live in such a community. In other words, the presence of capitalization implies that there is profit to be made from forming another community that is similar. Were such a community to form, it would lower demand for housing in the original community and would therefore reduce the level of capitalization of that community's superior mix of services and taxes. In a perfect Tiebout world, the emergence of new communities and the expansion and contraction of existing communities should lead to a disappearance of this type of capitalization.

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1. Extensive reviews of this literature are available in Wooders (1999) and Scotchmer (2002). The most recent elegant treatments of the salient issues can be found in Ellickson et al. (1999) and Conley and Wooders (2001), who find somewhat different solutions to the "integer problem" that has been extensively discussed in this literature.

2. This evidence is reviewed in Epple and Nechyba (2004).

Capitalization, Tiebout, and Efficiency In the end, Oates was correct in suggesting that the presence of capitalization is evidence in favor of Tiebout's notion that households vote with their feet in their residential location choices, *and* Edel and Sclar were correct in concluding that the presence of such capitalization is evidence that something is preventing the full Tiebout logic from playing out in the real world. Had Oates not found evidence of capitalization of local service and tax patterns in housing markets, one could not have concluded from such a lack of empirical evidence on capitalization that Tiebout was incorrect: such a finding would have been consistent with the full Tiebout model in which community formation and competition combine to bid away any capitalization.

Understanding the debate between Oates, on the one hand, and Edel and Sclar, on the other, builds the basic intuition for how the spatial dimension of communities in the real world places limits on the efficiency result that Tiebout had envisioned. Once clubs are tied to land (and thus become spatial communities), the only way a general efficiency result can emerge is if land is modeled in unrealistic ways that prevent the possibility of capitalization. Community boundaries (within a model) can, for instance, be assumed to be perfectly elastic and thus respond to increases and decreases in household demand, or land within communities can be modeled as perfectly elastically supplied, or an elastic entry and exit mechanism for new communities (whenever capitalization appears) can be introduced. But none of these assumptions would be consistent with the real constraints land imposes on real-world communities, which explains why decades of empirical studies have verified Oates's original demonstration of the existence of capitalization.

CAPITALIZATION AND INTERGENERATIONAL EFFICIENCY

Much of the Tiebout literature has focused on current public services and taxes, and thus has paid little attention to local public investments or the local debt policies that affect future generations. Some interesting recent work, however, has concentrated on such intergenerational issues and has investigated, in particular, how the choice of local tax bases as well as the degree of local competition can affect intergenerational efficiency. Rangel (2005) demonstrates that, because the impact of current local policies on future generations is capitalized into land values, local use of land taxes induces more intergenerational efficiency than use of other tax instruments. But this finding has little to do with Tiebout competition and is simply a consequence of land values incorporating future costs and benefits to landowners. Hatfield and Rangel (2006) go on to demonstrate that intercommunity competition adds to intergenerational efficiency. It introduces an additional capitalization mechanism, because future generations bid up the price of land in communities that invest in future public goods and do not rely on debt policies to do so. This interesting new area of research brings the important aspect of intergenerational considerations into a Tiebout framework. This type of capitalization—the capitalization of future costs and benefits—differs from that discussed earlier in which local public services and taxes affected only existing residents. The interesting implication of the intergenerational work is that policy design—focused on land taxation combined with fiscal competition—holds promise for achieving greater efficiency in a dimension Tiebout was not considering.

SOME OTHER IMPEDIMENTS TO TIEBOUT EFFICIENCY

This chapter has already dealt with a real-world violation of one of Tiebout's assumptions—that is, the implicit assumption that the entry/exit of communities is perfectly elastic, or that community boundaries or housing supply within communities is perfectly elastic. Other assumptions emphasized by Tiebout include household mobility (by well-informed households) across large numbers of communities that provide public services that are not subject to excessive returns to scale. It is reasonably clear that impediments to informed household choice—such as employment restrictions, lack of good information, high moving costs, or a lack of communities from which to choose—will place limits on the Tiebout mechanism (just as analogous factors in private goods markets would place limits on more standard market competition). Similarly, there is little controversy about the fact that public services that could be provided efficiently through decentralized community competition must be those that do not have excessive returns to scale (just as competition in private markets has similar efficiency properties only to the extent to which returns to scale are limited). Other explicit or implicit assumptions made by Tiebout, however, have less immediately obvious efficiency implications. Among these is the assumption of a smoothly functioning local political system, a lack of intercommunity spillovers, and lack of a role for social interactions.

Capitalization and Local Political Markets Tiebout had excluded from consideration any efficiency problems that might arise from distortions in local political processes. At the time, it was unclear whether one would have to worry about such distortions in the presence of a competitive local government environment. After all, it would seem intuitively plausible that competition itself could serve as a sufficiently strong disciplining force on local political institutions to weed out inefficient or rent-seeking local politicians, much like competition in private goods markets weeds out inefficient firms or firms that seek excessive economic profits. This intuition was put forward by Brennan and Buchanan (1980).

Here again, however, the unique role of land in community competition turns out to introduce complications not originally envisioned by Tiebout, but demonstrated later by Epple and Zelenitz (1981). So long as land is not in some way perfectly elastically supplied (as discussed earlier), there is room for local political institutions to seek rents and retain residents, with capitalization supporting such rent seeking in equilibrium even under perfect local government competition.[3] Although the degree of local government competition certainly limits the extent to which local rents can accrue to local political institutions, Epple and Zelenitz demonstrate that competition is not enough to eliminate the possibility of local politics playing a role in the degree of efficiency achieved by Tiebout competition. This finding has led to a large literature on the alternative modeling of local political institutions—a literature (not necessarily specific to the Tiebout model) that is not reviewed here.[4]

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3. Here perfect competition is defined as a situation in which the exogenously set number of communities in the model becomes large without endogenous community formation.

4. This literature is reviewed in some detail in Epple and Nechyba (2004).

Intercommunity Tax and Expenditure Spillovers In his original 1956 article, Tiebout explicitly assumed that the costs and benefits of local government actions were contained fully within a community—that is, he explicitly assumed away intercommunity spillovers. In the presence of such spillovers, it was clear from the beginning that local governments would not fully internalize the costs and benefits of their actions, which, in turn, would become an impediment to efficient competition, just as the presence of externalities in private goods markets is such an impediment.

Such intercommunity spillovers can arise in a variety of ways in the real world. On the tax side, for example, there has long been a debate between those who believe the property tax is a tax on mobile capital and those who believe it is an efficient benefit tax. To the extent to which the property tax is a tax on local capital (as hypothesized by Mieszkowski and Zodrow [1989]), a local government would underutilize such a tax, because that government does not take into account the benefit in other communities of capital that leaves as a result of an increase in the local tax. To the extent to which the property tax is a benefit tax (as hypothesized by Hamilton [1975] and Fischel [1992, 2001]), capital would not be lost—that is, it would not leave the jurisdiction when the tax is increased because of a simultaneous increase in local benefits tied to that tax. Local wage-income taxes are similar to taxes on mobile capital in that they would typically result in mobility of labor that benefits other communities (Nechyba 1997b) and would therefore be underutilized if set locally. Alternatively, there may be instances in which local taxes are paid by residents from other communities and are thus overused because local governments do not take into account the cost imposed on outsiders. Examples include sales taxes from tourists or taxation of a locally fixed industry that exports (and thus passes taxes on to consumers outside the community).

On the benefit side, one can also think of ways in which local governments may be responsible for providing services that impose costs or benefits outside the community. Local programs to improve the environment, for example, may also improve the environment outside the local community, but local governments will only consider the local benefits and thus engage in inefficiently low levels of environmental protection. Or if local governments engage in redistribution, they may engage in inefficiently low levels of redistribution in order to discourage immigration into the community by the poor and to encourage emigration of lower-income households from the community. Or a local community (such as a gated one) may engage in socially excessive levels of law enforcement in order to drive crime into other communities.[5]

Each of these examples of intercommunity spillovers has become relatively well understood theoretically over the past decades, although their empirical significance in particular cases is often unresolved. Policy recommendations that have emerged typically focus on (1) the appropriate assignment of tax bases and public good provision to appropriately sized communities, and (2) a system of higher level taxes and subsidies to internalize the remaining intercommunity spillovers

5. As demonstrated by Helsley and Strange (1999), the issue is a complicated one that depends on one's underlying view (or model) of crime.

(McKinnon and Nechyba 1997).[6] Meanwhile, another type of spillover, not hinted at in Tiebout's work, has emerged as a potentially more difficult challenge for policy makers, and therefore is treated separately in the next section.

Social Interactions, Segregation, and Social Multipliers Expenditure and tax spillovers are treated extensively in the Tiebout literature, and yet in the meantime awareness of a set of potentially more serious and more difficult-to-treat spillovers is emerging from the growing evidence about the importance of social interactions in a spatially segregated population. Both the theoretical and empirical divisions of the literature have long reflected the fact that Tiebout forces will result in segregation of households by socioeconomic class. The incentives for such economic segregation are straightforward: higher-income households have an incentive to find ways to exclude lower-income households, because (1) demand for public services is likely to increase with income, and (2) lower-income households bring with them a negative fiscal externality when local tax sources are used to finance public services.[7] Furthermore, Alesina, Baqir, and Hoxby (2004) document greater community fragmentation in urban areas as racial (and income) diversity increases.

On one level, one might take the view that such segregation by class or race is benignly efficient and simply reflects differences in demand for services by households from different demographic backgrounds. But even if taste differences are the sole driving force behind these observed segregation patterns, it may well be the case that the resulting reduction in social interactions across class and race gives rise to larger social tensions that have efficiency implications. Put differently, there may exist intercommunity spillovers (beyond tax and expenditure spillovers) that result from social stratification and that are not internalized by the Tiebout mechanism. Such spillovers are the subject of much research in the social sciences, although evidence of measurable economic impacts is sparse.[8]

The potential for segregation-induced efficiency problems, however, goes beyond the question of whether important social interactions are impeded by Tiebout segregation once the real-world fact that the supply of communities is

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6. Recently, the idea of intergovernmental transfers has received some scrutiny in the discussion of "market-preserving federalism." It is argued that relying on such transfers may exact a cost in the form of weakening the hard budget constraints that make fiscal competition a positive force. The wisdom of intergovernmental transfers has also been questioned in that it can lead to an obscuring of political accountability. See McKinnon and Nechyba (1997) for a discussion of both of these criticisms of intergovernmental fiscal transfers.

7. Note that the first of these reasons introduces a self-segregating force into a Tiebout economy—that is, the force results in voluntary separation along socioeconomic lines. Such segregation characterizes equilibrium models such as those emerging from the work of Epple, Filimon, and Romer (1993). By contrast, negative fiscal externalities may result in the musical chairs problem of local public finance models—a problem of poorer residents "chasing" richer residents in order to free-ride on their tax payments for local services. In many contexts, such fiscal externalities of the poor require the existence of rigid housing stocks or, alternatively, policies of exclusionary zoning, such as in Nechyba (1997a).

8. Benabou (1996) discusses the impact of such segregation and the resulting social interactions on long-run income inequality.

not as elastic as envisioned by Tiebout is taken into consideration. Bayer, Fang, and McMillan (2005), for example, have demonstrated that relatively few high-amenity, predominantly black neighborhoods can be found in U.S. metropolitan areas. High local amenities are therefore bundled with neighborhood racial composition, implying that black households must typically choose to live with predominantly white neighbors in order to gain access to good local public services. The presence of either a preference by black households to live near other black households or overt discrimination against black households by whites implies that black households face an implicit higher price for public amenities. In fact, the research by Bayer, Fang, and McMillan suggests that fully half of the observed differences in the consumption of local public amenities (such as schooling or crime protection) can be attributed to racial sorting within the local Tiebout economy. Put differently, racial sorting is as important as socioeconomic differences in explaining the disproportionate access to lower-quality public amenities by black households relative to white ones. Minority households therefore choose inefficiently low levels of public amenities in part because the local Tiebout economy does not exhibit the elastic supply of communities envisioned by Tiebout.

The fact that local amenities attract local neighbors who are, in turn, valued *as neighbors* because of social interactions that emerge within neighborhoods also has important implications for capitalization of such amenities. Some of the recent empirical literature, for example, has raised doubts about the extent to which demand in local housing markets and local housing prices are affected by changes in local school quality. In the most thorough empirical investigation of this factor, however, Bayer, Ferreira, and McMillan (2005) have demonstrated the existence of a powerful social multiplier. Changes in public school quality have an immediate modest effect on housing prices and neighborhood stratification, but that effect is multiplied by two to three times as households respond to changes in neighborhood composition that are initiated by changes in school quality. In other words, an increase in local public school quality results in an increase in local housing prices, which results in a flow of higher-income households into the community, which, in turn, results in significant further increases in housing prices as the higher average income in the community attracts higher-income households (above and beyond what would have been predicted by merely the increase in local school quality). This and other empirical work therefore provides considerable evidence of the importance of intracommunity spillovers that accentuate intercommunity differences in public amenities. Not only do these findings suggest inefficiencies in decentralized Tiebout economies, but they also raise equity concerns to which we turn next.

Categorical Equity and the Tiebout Model

Virtually all theoretical Tiebout models predict what is evident in the data: Tiebout mobility of households leads to social stratification, with richer and poorer communities providing vastly different levels of local public services. Such stratification may, as discussed earlier, result in inefficiencies if there are large gains from social interactions that are not adequately internalized in local Tiebout economies (or if additional supply inelasticities result in less community choice for some demo-

graphic groups). But beyond such potential inefficiencies, larger equity questions emerge. These questions, once again, bear a strong resemblance to similar concerns in private goods markets: while competition may under the conditions of the first welfare theorem lead to efficiency in such markets, it also may lead to vastly different private goods consumption levels for households from different socioeconomic classes and thus result in unacceptably high levels of inequality.

The extent to which this insight should be of concern depends somewhat on one's philosophical predispositions. Nevertheless, it seems that some types of social inequality will be found more worrisome than others. For example, suppose people are less concerned about the fact that some individuals drive a Lexus and others a Chevrolet than they are about the fact that some children have greater access to educational opportunities than others. In other words, although individuals may differ in their abstract notions of how acceptable different levels of income inequality are, there seems to be general agreement that inequities in certain "categories" of consumption are more deeply worrisome than inequities in others. For this reason, the notion of "categorical equity" becomes important in discussions of the desirability of Tiebout competition.

Several categories appear to be particularly relevant. For example, over the past several decades almost all states in the United States have been involved in extensive litigation related to public school financing. These cases largely consist of plaintiffs from poorer communities challenging a system of local provision of public schooling on the grounds that it has resulted in differential access to educational opportunities in ways that are directly related to the demographic backgrounds of families. Moreover, the greater attention being paid to peer and neighborhood effects across various social science literatures has come to suggest that children are differentially disadvantaged beyond effects arising in schools when local communities are excessively segregated by class and race. Although they have received much attention, levels of public safety are, in the same way, related to the demographic composition of local communities. And similar issues have been raised in the environmental literature, where some scholars have charged "environmental discrimination" based on evidence that communities serving poorer and more minority populations have tended to exhibit looser environmental protections.

A full exploration of the literature related to all of these "categories" is beyond the scope of this chapter. Perhaps because the categorical equity argument is the most persuasive when the category of concern is related to children, the Tiebout literature has most extensively explored the interaction of Tiebout forces with access to educational opportunities. Thus, the next section explores the tension between efficiency and categorical equity as it relates to education before the chapter turns briefly to a discussion of other categorical equity concerns.

ACCESS TO EDUCATION IN A TIEBOUT ECONOMY

For much of U.S. history, public education has been largely the responsibility of local governments.[9] The evidence suggests that competition between school districts

9. Much of the discussion in this section draws on an overview presented in Nechyba (2006a, 2006b) of previous work by Nechyba (1999, 2000, 2003a, 2003b).

has indeed resulted in efficiency gains, with more competitive metropolitan areas exhibiting greater school quality at lower cost (Hoxby 2000; Bayer and McMillan 2005).[10] At the same time, there is a clear correlation between public school quality and local demographic characteristics, with higher-income and lower-minority districts exhibiting higher school quality. Areas with greater demographic diversity have been shown to have larger numbers of school districts—further evidence that demographic groups choose different school districts all else being equal (Alesina, Baqir, and Hoxby 2004). As already suggested, resulting segregation of demographic groups into districts (that offer different levels of school quality) can also be viewed as a Tiebout efficiency result—that is, different demographic groups may simply have different levels of demand for educational quality, and Tiebout competition meets these different levels of demand precisely as envisioned by Tiebout. In fact, from a household demand perspective, equal levels of educational quality across districts would be inefficient if household demands for quality differ (as they surely do). From a categorical equity perspective, however, dramatic differences in school quality are clearly problematic and may, as demonstrated by Benabou (1996), perpetuate income inequality. In light of evidence supporting Tiebout efficiency in local education markets, the concern over accompanying categorical inequities then suggests a trade-off between efficiency and equity.

The Link Between Housing and (Quasi-)Public School Markets Public education is nominally free in the sense that public schools charge no tuition. In a world in which public school quality differs across schools, however, some other rationing mechanism must take the place of explicit school tuitions to determine which children end up in which schools. In U.S. metropolitan areas, this "other rationing mechanism" has arisen through housing markets in two distinct ways. First, low-income housing options are concentrated in some parts of metropolitan areas, both because of the historical evolution of such options as well as deliberate exclusionary local zoning policies that have guided this evolution. And, second, school quality is directly capitalized into housing prices, thereby making housing generally more affordable in the worse school districts. The housing market has therefore replaced explicit tuition policies as the rationing mechanism that limits options for lower-income households within metropolitan areas. Indeed, the housing market has, in essence, turned public schools into quasi-public schools—that is, schools are funded publicly, but priced through housing markets.

Nonfinancial Inputs and Segregation in Tiebout School Markets Were per pupil spending the only relevant input to school quality, one could envision an easy remedy to the categorical equity concern raised by the quasi-public nature of locally provided schools. But the vast economics of education literature has convincingly demonstrated that spending differences across schools at best account for a small portion of differences in school quality and that other, nonfinancial inputs into school quality play an important role. These nonfinancial inputs, such as

10. Some controversy surrounds the Hoxby (2000) article, as discussed in Rothstein (2005) and Hoxby (2005).

peer effects, parental monitoring, and teacher assignments to "better" schools, are highly correlated with the demographic characteristics of local populations. As a result, efforts to equalize spending across local school districts through higher-level government involvement have had a limited impact on intercommunity school quality differences and the accompanying levels of capitalization that continue to support unequal educational opportunities for children.

The apparent existence of segregating forces related to race adds a further level of complexity. As discussed earlier, Bayer, Fang, and McMillan (2005) have demonstrated that relatively few high-amenity, predominantly black neighborhoods can be found in U.S. metropolitan areas. Public school quality is therefore bundled with neighborhood racial composition, which implies that black households face an implicit higher price for public school quality to the extent to which they prefer to live near other black households or the extent to which they face discrimination in nonminority housing markets. Beyond the fact that segregation by class gives rise to nonfinancial input differences in local public schools, resulting in persistent inequality of educational opportunities by class, racial sorting within metropolitan areas adds further categorical equity concerns in addition to the efficiency concerns discussed earlier.

School "Clubs" and Public School "Communities" Schools represent a particularly interesting application of Tiebout modeling, in part because of the availability of the obvious private alternatives to locally provided public schools. The traditional local public school districts are examples of spatial communities, because access to local public schools is typically restricted to local residents. By contrast, private schools as well as nontraditional public schools (such as charter and magnet schools) are closer to "clubs" in that the spatial dimension is weaker because of the lack of a local residence requirement.[11] When school "clubs" exist alongside school "communities," residential stratification patterns change dramatically from what one would predict in a pure Tiebout school community model.

The intuition for how stratification patterns are altered is relatively straightforward, although the magnitude of the effect of merging school clubs with school communities can be counterintuitively large. Within a school community model, capitalization of local school quality results in fairly dramatic stratification of households by socioeconomic class. Nechyba (2003b), for example, finds that the average "rich" community has a mean household income that is four to five times the mean income of the average "poor" community and that segregation is supported by both the differential availability of lower-quality housing across communities and the sizable levels of capitalization of such school differences into housing values. When private school clubs are introduced into the same housing markets, however, economic segregation falls by half and capitalization of public school quality is reduced substantially, because households with children in private schools have an incentive to take advantage of housing "bargains" in poor school

11. However, the spatial element is never fully removed in school "clubs" that do not have a residence requirement. Hastings, Kane, and Staiger (2005), for example, find that proximity to schools is a prime motivating factor when parents are able to choose between schools.

districts as they unbundle their school choice from their housing choice (Nechyba 2003a, 2003b).[12]

The emergence of school clubs in Tiebout economies therefore reduces economic residential segregation. To the extent to which efficiency and equity concerns in the Tiebout economy arise from social interactions within communities (and outside schools), the fostering of private and nontraditional public schools alleviates the inequities and inefficiencies. At the same time, there is no guarantee that such school clubs will not foster social segregation within schools. Furthermore, it is not at all clear that the introduction of school clubs would reduce either residential or school-based racial segregation. In fact, work by Bayer, Fang, and McMillan (2005) suggests that the relative scarcity of high-amenity black communities currently induces higher-income black households to live with white households, because the black households then gain them access to better public schools. Were such black households able to unbundle their schooling decision from their housing decision in the presence of more school clubs, this evidence suggests that they might choose to live in minority rather than predominantly white communities. At the same time, black households that currently choose poor public schools because of a desire to live near other black households would gain access to more school options under greater activity by school clubs.

OTHER CATEGORICAL EQUITY CONCERNS

Other categorical equity concerns that arise within the Tiebout context relate to public safety and environmental quality, which are similarly related to average community income in the data. To the extent to which these "categories" of goods are less focused on children, the equity concern might be less pronounced than that for public schooling. Put differently, it may well be efficient for lower-income households to consume smaller quantities of public safety and environmental quality (just as such households consume smaller quantities of most private goods),[13] and that may be a socially acceptable outcome from an equity standpoint. Nevertheless, the finding by Bayer, Fang, and McMillan (2005) that U.S. metropolitan areas are characterized by a relative absence of high-amenity minority neighborhoods, combined with the finding of either discrimination against minorities in nonminority neighborhoods or, alternatively, a strong desire by minority households to live near minority neighbors, again suggests that Tiebout choice might be quite limited for certain demographic groups. Thus, as it is for education, categorical inequities

12. As it turns out, these effects are quite independent of how private school advantages are modeled. To be more precise, private school markets must have some comparative advantage in order to compete with "free" public goods. In addition to location, those advantages may include cost efficiency, vertical differentiation through cream skimming of students, or horizontal differentiation through curricula targeting the pedagogical, religious, or other preferences of parents. Regardless of which advantages are assumed for the private school market, the impact on residential segregation remains roughly the same (Nechyba 2003a, 2006b).

13. As noted in the discussion of social interactions and efficiency, however, the presence of neighborhood effects may well imply that the difference in public safety across communities is socially inefficient.

related to public safety and environmental quality may be more pronounced for some demographic groups than for others.

Bringing Tiebout into Urban Economics

The discussion thus far has made no explicit distinction between work by urban economists and work by local public finance, or Tiebout, economists. The distinction between urban economics, which focuses on the evolution of cities, and local public finance, which focuses on the evolution of communities, is, in fact, quite artificial. After all, most U.S. households now live in metropolitan areas (or cities), and metropolitan areas are divided into distinct communities that compete with one another, as Tiebout suggested. It is therefore not surprising that empirical urban economists frequently consider local public goods in estimating aspects of cities such as housing prices, nor is it surprising that local public economists might choose "distance to the central city" as a local amenity to be emphasized. At the same time, these interactions across the subdisciplines of urban economics and local public finance have been rather superficial up to this point and largely confined to the choice of regressors in "reduced form" statistical models. To truly understand the general equilibrium interactions of Tiebout forces with traditional urban economics forces, one needs a *structural economic* (as opposed to merely a statistical) modeling framework that makes room for both, as well as room for their interactions with one another.[14] Given the empirical significance of Tiebout forces within metropolitan areas, it therefore seems doubtful that substantial progress in understanding either Tiebout forces or the traditional problems of cities can be made without greater merging of these subfields whose theoretical underpinnings are already quite developed.

Much of urban economics is based on variants of the well-known monocentric city model of the way in which cities evolve as they expand. Some such models have been used to investigate the phenomenon of urban sprawl and the evolution of "edge cities," as central city districts have decreased in economic importance over the last half-century. Urban economists have asked whether this sprawl is good or bad, and whether public policies (such as federal subsidies for roads or the use of property taxes) have contributed to excessive expansions of the urban fringe. When viewed from a Tiebout perspective, however, the question is whether the expansion of cities has been guided by Tiebout forces, and whether it has resulted in greater applicability of Tiebout's insights as the number of communities within a typical metropolitan area has increased through expanding numbers of suburbs. In the end, an understanding of cities must be based on both the spatial geography and economics of cities (which is largely absent from the Tiebout literature) and attention to the Tiebout forces that helped to shape suburbs (which is

14. "Structural economic" model refers to a well-specified economic (general equilibrium) model whose structure captures the salient economic forces from these literatures and whose structural parameters are set through calibration or estimation. Such a model would, no doubt, be too complex to yield analytically tractable results, but with its parameters set to yield a computational model that rationalizes data, it would provide a policy simulation model that is both grounded in theory and empirically relevant.

largely absent from the traditional urban economics literature). Although, as mentioned earlier, empirical work in both areas has included elements from the other in a reduced form manner, the two approaches are structurally separate—that is, they have not been included in unified structural models that permit a disentangling and comparing of the importance of interacting forces for particular policy interventions within one, internally consistent structural framework. A more integrated model that combines insights from the urban and local public finance literatures may provide a better tool for considering issues related to the fiscal federalism in which higher-level governments attempt to address equity and efficiency concerns in Tiebout cities.

SUBURBAN SPRAWL

It is undoubtedly true, as emphasized by urban economists, that suburban sprawl finds its roots in the United States in the combination of the growing use of automobiles, a desire by many households to consume more land (and housing) than is available in central cities, and the large public investments in road infrastructure (Glaeser and Kahn 2004).[15] At the same time, because of the wider residential choices available in metropolitan areas as a result of these factors, a variety of Tiebout forces have helped to shape the path that urban and suburban growth has taken over the past half-century. These forces can be divided into those that have helped to push households out of inner cities, such as crime and deteriorating public schools, and those that have helped to pull households into suburbs, such as more homogeneous community populations, better public schools, and less crime. Put differently, suburban sprawl would likely have emerged in the absence of Tiebout forces, but the presence of Tiebout forces has helped to shape the ways in which suburban growth has evolved.

The lack of adequate incorporation of Tiebout forces into structural urban modeling, or, alternatively, the lack of an urban economics influence on structural Tiebout models, leaves one at this point largely guessing about the precise interaction of traditional urban and Tiebout forces in the continuing evolution of cities. Tiebout models that incorporate empirically derived inter- and intracommunity distributions of housing quality (such as Nechyba 1997a) illustrate that the equilibrium outcome of Tiebout sorting depends critically on the underlying housing market, and it is within urban economics that one can find evidence of how housing stocks are distributed across metropolitan areas. Where people live then depends on what housing is available, how availability relates to the economic geography of cities, *and* how it relates to public amenities accessible from particular housing units.

Consider, for example, the policy question of how to deal with the problem of road congestion in metropolitan areas. On the one hand, such congestion is not surprising in light of the fact that access to roads is largely not priced either through tolls or taxes on gasoline. On the other hand, the large amount of time that Americans spend on roads commuting to work, driving children to school, and the like is difficult to reconcile with a model that does not incorporate the

15. This section draws on a recent discussion of urban sprawl in Nechyba and Walsh (2004).

fact that households choose a variety of local amenities by choosing where they live.[16] Optimal policy responses to congestion on metropolitan roads may therefore involve a combination of policies. For example, in view of the falling crime rate in inner cities (one of the push forces that drove families to the suburbs over the past decades[17]), increasing school choice policies that would result in a greater variety of school clubs within inner cities may lead to a reversal of the trend of families moving to the suburbs when their children become school age. Such a policy change could be reinforced by imposing higher costs for using metropolitan roads (through, for example, congestion tolls). But unless more is known about how urban landscapes are connected to Tiebout forces, it is difficult to determine how residential choices and commuting patterns would change under different combinations of such policies.

FISCAL FEDERALISM AND U.S. CITIES

More generally, the typical policy response to the efficiency and equity concerns in U.S. Tiebout economies has been to consider higher-level government fiscal interactions with local communities through grants of various types. The related fiscal federalism literature has evolved largely in the context of local public finance models that consider the various economic and political trade-offs arising from such hierarchical fiscal interactions.[18] (Here too, however, greater attention should be paid to the fact that U.S. Tiebout economies are fundamentally the economies of metropolitan areas, including inner cities and suburbs.) Within Tiebout-based models of fiscal federalism, the literature has become increasingly cognizant of the potentially important role for capitalization effects. In the literature on state school financing formulae, there is much debate about the extent to which district power equalization programs (or matching grants based on local property wealth) can fundamentally alter the relative intercommunity prices of housing. More precisely, to the extent to which matching grants are differentially targeted to poorer communities, property values rise in such communities and fall in wealthy communities. Within a U.S. metropolitan area, however, poorer communities are often inner cities, which add a dimension that is important for considering the impact of fiscal federalism on the city as a whole but is missed in a Tiebout-based framework, which abstracts away from the economic geography of cities.

Conclusions

Tiebout's insight that household mobility plays an important role in local economies is, at this point, beyond challenge. In many instances, such mobility indeed plays the disciplining role envisioned by Tiebout, infusing local economies with a competitive force that allows for market-like provision of public services. Although

16. A recent estimate of the time cost of commuting in major U.S. cities was $60 billion a year (Shrank and Lomax 2003).

17. For example, Cullen and Levitt (1999) estimate that a 10 percent increase in crime is associated with a 1 percent decline in city populations.

18. See Epple and Nechyba (2004) for a more detailed discussion of these interactions.

this chapter has focused on efficiency and equity concerns that arise under such market provision, it should be emphasized that the Tiebout-like market provision of public services in many instances does not raise such concerns. In fact, in contexts such as homeowners associations and smaller club-like settings, few would even begin to question the positive impact of these forces. In the larger setting of local government competition, however, Tiebout's hypothesis holds imperfectly, with capitalization of local policies suggesting less than perfect efficiency, while simultaneously reinforcing the insight that household mobility plays a critical role. At the same time, with respect to public services such as education, the economic and racial segregations that result from Tiebout competition raise important larger concerns that suggest a need to, at least to some extent, loosen the connection between provision of such services and residential location choices. Furthermore, within the U.S. setting where Tiebout economies are the economies of cities and suburbs, there is a limit to what one can confidently say about policy without introducing urban economics more directly into well-developed structural Tiebout frameworks. This area is among the most promising for future research.

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