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The Market for Local Public Goods

H. Spencer Banzhaf

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Abstract

Markets are an efficient way to allocate goods and services in an economy, but sometimes markets are said to "fail," such as when they are unable to provide public goods. I argue that for a wide class of environmental and other public goods—namely, local public goods provided by local jurisdictions—a market-like process does provide and allocate those goods. This argument, originally articulated by Charles Tiebout in 1956, has been criticized in recent decades as ignoring a jurisdictional choice externality, in which too many households crowd into desirable communities in an attempt to free ride on the public goods provided by neighbors. However, zoning is a key mechanism for closing the commons and preventing overcrowding. Proponents of the critique have offered various types of empirical evidence purporting to support their point of view and the ineffectualness of zoning. However, I argue that the empirical work to date on this issue either fundamentally misunderstands the issues or actually imposes the critique as a maintained assumption, rather than testing it. I present empirical evidence that is consistent with the idea that zoning achieves the desired end of pricing access to local public goods.

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INTRODUCTION

One definition of an economy is a social process that determines what a society produces, how it produces it, and to whom it allocates it. Given the set of possible goods to produce, the potential production methods, and the people to assign them to, the number of potential answers to those questions is enormous. How can all those decisions possibly be coordinated? One idea is to gather the best-trained social scientists, give them the best available data about production costs and the needs of the population, give them the best computers available to crunch the data, and let them coordinate the decisions through centralized command and control.

A very different approach is to use free markets to coordinate those decisions in a decentralized fashion. As Friedrich Hayek famously argued over a half century ago, markets have the ability to process diffuse information and feed it back to participants making decisions in the economy.[1] Consider, for example, the market for men's running

1. F. A. Hayek, *The Use of Knowledge in Society*, 35 AM. ECON. REV. 519 (1945). *See generally* PHILIP MIROWSKI, MACHINE DREAMS: ECONOMICS BECOMES A CYBORG SCIENCE (2002) (presenting a much wider-ranging

shoes and suppose in one year that demand is strong for some unanticipated reason. In that case, given supplies, retailers may raise their prices or, alternatively, decline to put men's running shoes on sale. Seeing the higher prices, manufacturers will want to make more of those types of shoes. Conversely, if there are too many, prices will fall and suppliers will stop producing shoes for a time until inventories fall and prices rise again. Producers and retailers, as entrepreneurs, smell out the opportunity to make profits and both set their prices and react to prices accordingly. In this way, markets can provide a self-regulating order coordinating an economy's production and allocative decisions.

There is a consensus among economists that such forces work well in most circumstances. The debates center on the exceptions—about where and when the exceptions occur and how significant they are when they do. One such contested area is a set of goods known as "public goods"—goods that are shared by groups. Some public goods, like national defense, must be provided by national governments. Other public goods like police, fire safety, city streets, and schools can be, and typically are, provided by local jurisdictions.

This Article will consider the case of such local public goods, emphasizing cases where local jurisdictions partially determine the quality of the local environment enjoyed by local residents. Consider, for example, the case of local green spaces, important environmental amenities. These can be influenced by zoning (such as minimum lot sizes), conservation easements, purchase of conservation lands or parks, urban forestry practices, and so forth.

The city's morphology and tree canopy, in turn, can affect local air pollution and urban heat island effects. Other local policies affect air quality more directly. Rules allowing or prohibiting industrial activities are one obvious example. Another is the area's transportation policies, from individually small engineering projects that improve the flow of traffic on a city street to walkable neighborhoods to county- or regional-level mass transit systems. By the same token, the city's morphology and tree canopy can affect storm water runoff, stream quality, and the water table. Local water conservation ordinances and practices can affect water levels in lakes and streams. Treatment of municipal wastewater and/or regulations on septic tanks affect water quality. And so forth. In practice in the United States today, many of these policies are influenced by federal as well as local policies. But this does not diminish the important role for local jurisdictions or, more to the point, the potential for them to be largely or even solely delegated to local jurisdictions.

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overview of the turn in modern economics to the idea of information processing); Bruce Caldwell, *Hayek and Socialism*, 35 J. ECON. LITERATURE 1856 (1997) (reviewing Hayek's argument, set in the historical context of his debate with market socialism).

It is not the purpose of this Article to survey this entire field or discuss all the proposed—and contested—limitations to markets.[2] However, I will argue that for locally provided public goods, a market—or, at least, a market-like process—coordinates the level and allocation of local public goods provided by local jurisdictions such as counties and municipalities. Accordingly, when these public goods are provided by local governments out of local tax revenues or with local codes and regulations, market-like forces help ensure better outcomes. The same cannot be said when these goods are provided by state or federal governments. For this reason, I suggest that public decisions should be made at the local level whenever possible, as is consonant with the principle of subsidiarity.[3]

The idea that cities compete in a market-like environment was first and most famously articulated by Charles Tiebout in 1956.[4] In this Article, I will introduce Tiebout's original argument, discuss its implications, and discuss the potential weakness in the argument. In particular, important questions surround the extent to which local property taxes and zoning ordinances interfere with markets. In this Article, I will argue that zoning, far from interfering with local property

2. *See generally* RICHARD CORNES & TODD SANDLER, THE THEORY OF EXTERNALITIES, PUBLIC GOODS, AND CLUB GOODS (2d ed. 1996) (providing a general overview of the limitations of markets); David D. Haddock, *Why Individuals Provide Public Goods*, *in* ACCOUNTING FOR MOTHER NATURE: CHANGING DEMANDS FOR HER BOUNTY 261 (Terry L. Anderson et al. eds., 2008) (making a vigorous defense of the potential of markets to provide more environmental public goods than is often acknowledged); Terry L. Anderson & Dominic P. Parker, *Transaction Costs and Environmental Markets: The Role of Entrepreneurs*, 7 REV. ENVTL. ECON. & POL'Y 259, 273 (2013) (noting that environmental entrepreneurs can be more successful when looking at "positive transaction costs as an opportunity rather than a problem" and that, "[b]y adopting innovative strategies that lower the transaction costs of economic exchange, these entrepreneurs are constantly finding new ways to capture the value of environmental resources").

3. The idea of subsidiarity originated in Catholic social doctrine. *See* Pope Pius XI, *Quadragesimo Anno* § 80 (1931). *See generally* WALLACE E. OATES, FISCAL FEDERALISM (1972); George A. Bermann, *Taking Subsidiarity Seriously: Federalism in the European Community and the United States*, 94 COLUM. L. REV. 331 (1994) (discussing modern legal and policy contexts). Much of the economic discussion on this issue focuses on spatially delimited public goods such as environmental quality. For discussions in that context, though with broader implications, see generally Jonathan H. Adler, *Jurisdictional Mismatch in Environmental Federalism*, 14 N.Y.U. ENVTL. L.J. 130 (2005); Wallace E. Oates, *A Reconsideration of Environmental Federalism*, *in* RECENT ADVANCES IN ENVIRONMENTAL ECONOMICS 1, 22 (John A. List & Aart de Zeeuw eds., 2002).

4. Charles M. Tiebout, *A Pure Theory of Local Expenditures*, 64 J. POL. ECON. 416 (1956).

markets, actually plays a crucial role in facilitating those markets. I also present empirical findings consistent with the notion that zoning has been sufficient to price entry into local jurisdictions.

In Part I, I first overview some basic principles of public goods generally, before moving on to discuss the case of local public goods and local jurisdictions in Part II.

I. PUBLIC GOODS: MARKET FAILURE OR MARKET PROVISION?

A. Non-Excludability and Non-Rivalry

Public goods are characterized by two features, non-excludability and non-rivalry.[5] Markets sometimes are said to "fail" under such circumstances because the price mechanism either seemingly cannot work or would not make sense even if it could.[6]

Consider first the excludability problem. With private goods, people can be excluded from enjoying the good if they do not pay for them: no cash, no shoes. This does not necessarily hold for public goods. Even if people do not pay for them, they cannot feasibly be excluded from enjoying public goods like clean air or a sound national defense. It is, after all, pretty hard to ask somebody not to breathe or to let slip through only those terrorists targeting people who fail to contribute to the national defense. So the argument goes that if those goods were provided by a market, people would under-provide these goods and try to free ride off others who pay for them.

The interpretation, or evaluation, of the excludability problem depends on the extent to which the second feature, non-rivalry, is also present. Rivalry centers on the question of whether one person's enjoyment of a good detracts from another person's ability to enjoy it. Private goods are rivalrous: if I wear a pair of shoes, then you cannot wear them too. Public goods are not: if I breathe the clean air in a city, it will not detract from your enjoyment of the same air at all. Thus, non-rivalry raises the question of whether it would be desirable to exclude people from enjoying a good, even if it were feasible. Even if I

5. *See* Paul A. Samuelson, *The Pure Theory of Public Expenditure*, 36 REV. ECON. & STAT. 387 (1954) (discussing public goods) and Cornes & Sandler, *supra* note 2 (providing a more modern and comprehensive treatment); *but see* R. H. Coase, *The Lighthouse in Economics*, 17 J.L. & ECON. 357 (1974) (for an opposing view). *See generally* H. Spencer Banzhaf et al., *Nonregulatory Approaches to the Environment: Coasean and Pigouvian Perspectives*, 7 REV. ENVTL. ECON. & POL'Y 238 (2013) (discussing specifically non-excludability and non-rivalry and the range of government policies and non-governmental institutions that can overcome them).

6. Francis M. Bator, *The Anatomy of Market Failure*, 72 Q. J. ECON. 351 (1958).

were a free rider in the contribution to air quality, and even if it were possible to exclude me from such air, would it make sense to do so, given my enjoyment does not detract from others'?[7] Goods like these, where non-rivalry is present as well as non-excludability, are known as pure public good.

When non-excludability is present but not non-rivalry, the good is known as a commons good. A classic example is a fishery, in which the fish are rivalrous (if I catch one—or eat one!—you cannot) but in which there is open access to the sea.[8] Unless institutions are developed to overcome the problem, the resulting economic incentives drive overfishing, with individuals considering their own catch without considering how it diminishes the catch of others. This is known as the "tragedy of the commons."[9]

B. Overcoming the Excludability Problem: Closing the Commons

The excludability problem, though sometimes a challenge, can often be overcome. Indeed, entrepreneurs have devised many ways to do so.[10]

1. Clubs

One simple example of overcoming the excludability problem in the provision of public goods is clubs, like local swim and tennis clubs.[11] A swimming pool is non-rivalrous, at least up to a point at which it becomes congested, so it makes sense for a large number of people to pitch in and enjoy the pool together. This could not happen if free

7. Actually, the best answer may be "maybe." If the good were supported with private fees, it would inefficiently exclude some low-willingness-to-pay (but also non-rival) consumers. *See* Harold Hotelling, *The General Welfare in Relation to Problems of Taxation and of Railway and Utility Rates*, 6 ECONOMETRICA 242 (1938). On the other hand, if the good were supported with government funds, it would inefficiently impose taxes, which creates a dilemma: inefficient exclusion of a non-rivalrous good or inefficient subsidization. *See* R. H. Coase, *The Theory of Public Utility Pricing and Its Application*, 1 BELL J. ECON. & MGMT. SCI. 113 (1970).

8. H. Scott Gordon, *The Economic Theory of a Common-Property Resource: The Fishery*, 62 J. POL. ECON. 124 (1954).

9. Garrett Hardin, *The Tragedy of the Commons*, 162 SCI. 1243 (1968); Elinor Ostrom, *Tragedy of the Commons*, NEW PALGRAVE DICTIONARY OF ECONOMICS http://www.dictionaryofeconomics.com/article?id=pde2008_T000193 (Steven N. Durlauf & Lawrence E. Blume eds., 2008).

10. *See* Anderson & Parker, *supra* note 2 (providing an overview in the context of environmental goods).

11. *See* James M. Buchanan, *An Economic Theory of Clubs*, 32 ECONOMICA 1 (1965). *See generally* CORNES & SANDLER, *supra* note 2; Matthew J. Kotchen, *Voluntary- and Information-Based Approaches to Environmental Management: A Public Economics Perspective*, 7 REV. ENVTL. ECON. & POL'Y 276 (2013); Todd Sandler & John Tschirhart, *Club Theory: Thirty Years Later*, 93 PUB. CHOICE 335 (1997).

riding were a severe problem. But, in fact, excludability is not a real problem here: it is a simple matter to build a gate around the pool and check ID cards. Clubs do precisely that. They gather fees from members, fix a limit on the number of members beyond which congestion would be a problem, provide public goods to the members, and exclude nonmembers. As James Buchanan has shown, clubs look a lot like an efficient market with private firms each having some limited economies of scale: market discipline in which clubs can form and dissolve leads them to be the optimal size (which balances the economies of scale of allowing more people to use a fixed resource and the congestion of too many people), and, moreover, individual households join those clubs that most suit them.[12]

2. Bundling and Weak Complementarity

Another approach to the private provision of public goods involves a strategy that economists call "bundling."[13] Bundling is a concept that is much broader than public goods: it involves any situation where two or more goods are grouped together and sold as a package (hence, "bundle"), whether those goods are public goods or not. For example, automobiles may be viewed as a bundle of an engine, a body, a stereo system, and so forth. Monopolies often try to bundle goods together as a way to exploit their monopoly power.[14] An example in this context is when Microsoft tried to bundle Internet Explorer with Windows. In some of these contexts, bundling may be problematic from an efficiency point of view because it exacerbates monopoly power.

But when public goods are bundled with a private good, it can overcome the excludability problem and thus be efficiency enhancing.[15] This is especially true when preferences for the public good and the private good are governed by a condition that economists call "weak complementarity."[16] Weak complementarity is a special kind of relationship between two goods, where one good does not matter to a consumer unless it is consumed jointly with a second good. A simple example might be a consumer who does not care about jam unless he also has bread. Another might be a consumer who doesn't care about gasoline unless he also has a car.

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12. Buchanan, *supra* note 11.

13. William James Adams & Janet L. Yellen, *Commodity Bundling and the Burden of Monopoly*, 90 Q. J. ECON. 475 (1976).

14. *Id.*

15. *See* Banzhaf et al., *supra* note 5; Geoffrey Heal, *Bundling Biodiversity*, 1 J. EUR. ECON. ASS'N 553 (2003); Kotchen *supra* note 11.

16. *See* KARL-GÖRAN MÄLER, ENVIRONMENTAL ECONOMICS: A THEORETICAL INQUIRY 183–91 (1974); V. Kerry Smith & H. Spencer Banzhaf, *A Diagrammatic Exposition of Weak Complementarity and the Willig Condition*, 86 AM. J. AGRIC. ECON. 455 (2004).

When entrepreneurs bundle a public good with a private weak complement, it can overcome the excludability problem. Although consumers might be able to avoid supporting a public good in isolation, if the public good is only enjoyed when it is consumed with a private weak complement then consumers will be forced to pay for the private good to enjoy the public good. The payment for the private good, in turn, provides an opportunity to collect for the public good at the same time.[17] To see this more clearly, consider two examples.

One example is ecotourism.[18] In this case, the public good may be birds in Costa Rican rain forest habitat or elephants and other wildlife in southern Africa. Without doubt, these are special things, and people have value for them. Many people would value the opportunity to see them firsthand in their natural environment. But to do so, they would need a nearby lodge at which to stay and a guided safari tour. One cannot enjoy the elephants without these things. Yet access to the lodge and the safari are easily excludable. They are private weak complements linked to the public good. To put it in other terms, they are a gateway to the public good. People are willing to pay for the lodge and safari guide, but only because they are the gateway to the elephants and other wildlife. Entrepreneurs know this, so the lodge owner and/or the safari guide have an incentive to provide elephant habitat.[19]

Another example—one closer to our context of local public goods—comes from real estate development. Geoffrey Heal tells the story of Spring Island, South Carolina, which was highly prized for its ecosystem.[20] When the island's land came up for sale, the state tried to bid for it but was outbid by a private developer, much to the chagrin of environmentalists. Yet the developer developed only 500 of the 5500 developable lots, deeding the remainder to a land trust. Because the conservation land was so valuable, 500 lots nearby such an ecosystem could command a premium even above 5500 without the nearby conservation. This dynamic again depended on a kind of weak complementarity and bundling. The developed lots were essentially bundled to a nearby preserve. Because people could only enjoy that preserve (or, at least, could much more easily enjoy that preserve) with

17. Banzhaf et al., *supra* note 5, at 246–47.

18. For discussion of this example, see GEOFFREY HEAL, NATURE AND THE MARKETPLACE: CAPTURING THE VALUE OF ECOSYSTEM SERVICES 61–70 (2000); Anderson & Parker, *supra* note 2, at 270–71.

19. In the specific case of elephants, CAMPFIRE programs originating in Zimbabwe are a classic example of this dynamic. *See* Anderson & Parker, *supra* note 2, at 270. Of course, other examples can be found for other types of ecotourism.

20. Geoffrey Heal, Bundling Public and Private Goods: Are Residential Development and Environmental Conservation Necessarily in Conflict? 1 (rev. April 2001) (unpublished manuscript), *available at* http://www2.bren.ucsb.edu/~kolstad/events/workshop_5-01/papers/Heal_paper.pdf.

property nearby, they were willing to pay more for such property. This, in turn, provided an incentive to the developer to protect the majority of the land.

II. A MARKET IN LOCAL PUBLIC GOODS

In this Part, I argue that the provision of local public goods by local jurisdictions closely resembles the private provision of public goods discussed in the previous sections. The essence of the argument lies in the model of Charles Tiebout, who famously argued that citizens choose communities very much like the way they choose private goods.[21] Consequently, just as consumers win when businesses compete, citizens win when cities compete.

A. Excludability in Local Public Goods

When viewed in the light of club theory and the theory of bundling discussed in the previous section, local public goods begin to look more like excludable private goods than like pure public goods. Consider a local public good such as a county library system. It is a simple matter for a librarian to check for a library card before lending out the books. In this respect, the library is not unlike a private recreation club. Just as you can only use the pool if you pay your membership fee, you can only check out the book if you are a local resident (and, thus, probably, a taxpayer). Another, more important example is local public schools. One's children cannot attend the schools unless they are proven to be local residents. The library card or other proofs of residency are no different than the membership cards at the private club: they are the gateway to enjoying the local public goods within.

Of course, many public goods like local parks and air quality do not have gateways. Most city parks welcome any visitors to enjoy their picnic tables and playgrounds, and anybody can breathe the air. But, for the most part, one does not really enjoy these goods unless one lives or works near them. For example, I did not really care about Atlanta's parks or its air quality when I lived in Washington, D.C., but I did when I moved to Atlanta. Although occasionally one may visit the park

21. Tiebout, *supra* note 4, at 422. Though Tiebout's argument is well known in the academic literature, what is less understood is that he was explicitly critiquing Samuelson's argument that markets cannot provide public goods. Samuelson, *supra* note 5, at 388. Tiebout's title, *A Pure Theory of Local Expenditures*, is clearly a play on Samuelson's more pretentious *The Pure Theory of Public Expenditure*. For background on Tiebout and his motives, see generally William A. Fischel, *Footloose at Fifty: An Introduction to the Tiebout Anniversary Essays*, *in* THE TIEBOUT MODEL AT FIFTY: ESSAYS IN PUBLIC ECONOMICS IN HONOR OF WALLACE OATES 1, 1–4 (William A. Fischel ed., 2006).

of a nearby jurisdiction, for the most part these public goods are only enjoyed by the citizens of the jurisdiction that provides them.[22]

Thus, local public goods are bundled to the private weak complement of local real estate. In the same way that the Spring Island real estate developer bundled his development to a conservation preserve, land and housing in any community are bundled to its local public goods, taxes, and zoning restrictions. One does not enjoy those goods (or pay those costs) unless one lives in the community. Living in the community, in turn, requires owning or renting real estate in the community, and real estate is an excludable private good.

Consequently, we really do have a market in public goods—local public goods at least. The real estate market is not just a market in land: it also is a market in the public goods available to people living on that land.

B. Rivalry and Non-Rivalry in Local Public Goods

Of course, overcoming the excludability problem is not the entire story. It may only make clear sense to exclude somebody if non-rivalry is not also present. To sort out this issue, it is again helpful to distinguish between the real estate and the bundled local amenities and publicly provided goods. Clearly, the real estate itself is rivalrous. If I put a house on a lot, you cannot. Likewise, if I live in a house, you cannot. Thus, it makes sense to treat land and housing capital as private goods, and of course we do.

What about locational amenities and publicly provided goods? Such goods may be non-rivalrous or rivalrous depending on subtleties in how they are defined and whether the local population can affect the amenity through congestion. Consider first amenities like proximity to the sea, the local climate, or air quality. Proximity to the sea may seem as exogenous as an amenity can be, and unaffected by the population. If so, then my enjoyment of this amenity does not detract from another's ability to enjoy it, and it is non-rivalrous. However, if what we really mean is not literally proximity but rather *access* to the sea, it may be that adding more people to a jurisdiction near the sea does have a congestion effect, after a point. For a sparsely populated area, there may be no congestion. But as more people crowd into the area, transportation routes to the sea may become congested, limiting accessibility, or perhaps the seaside itself may become crowded. In this

22. Thus, it is fitting that the scale of the jurisdiction matches the extent of the market for the public good. *See* OATES, *supra* note 3, at 33. For example, cities provide smaller parks attracting only very nearby residents; counties provide larger parks drawing households from a larger area; states and nations provide still larger parks attracting households from still wider areas. Likewise, cities provide local streets, counties provide roads and rural highways, and states and nations provide expressways.

case, the congestion effects make the public good rivalrous: if I move in to enjoy the access to the sea, it does indeed affect others' access.

Similar stories can be told for local climate, air quality, and open space. At first, for a sparsely populated area, these things may be exogenous, determined by nature (in the case of climate) and far-flung industrial activities (in the case of air quality). If I move to a sparsely populated location to enjoy the climate, it will not affect the climate and will not affect others' enjoyment of it. So far, the climate is non-rivalrous. But as more people move in, additional people may affect the local climate, as the lost tree canopy, additional hardscape, and so forth contribute to an urban heat island effect.[23] Likewise, in the case of air quality, the local air shed may at first be able to absorb the wastes of a small population without much apparent effect, but as more people arrive, its capacity may become congested and overwhelmed by the lost tree canopy and the additional driving, lawn mowing, barbecues, and so forth, at which point the atmosphere becomes a rivalrous good.[24] In the case of open space, people may value both permanently protected open space like parks and nature areas and the greenery on private open space like low-density lots. Providing a park can attract people, but as people move in to enjoy the amenity, the higher density decreases the private greenery and, hence, total green space.[25]

Finally, consider locally tax-financed public goods, such as city streets, schools, and parks. Economists generally view these goods as congested as well.[26] Again, perhaps at first they are uncongested and

23. *See* BRIAN STONE, JR., THE CITY AND THE COMING CLIMATE: CLIMATE CHANGE IN THE PLACES WE LIVE 83 (2012).

24. For discussion of atmospheric congestion at a more global level, see Banzhaf et al., *supra* note 5, at 248–49; Brendan Fisher, R. Kerry Turner & Paul Morling, *Defining and Classifying Ecosystem Services for Decision Making*, 68 ECOLOGICAL ECON. 643, 647 (2009).

25. *See* Randy Walsh, *Endogenous Open Space Amenities in a Locational Equilibrium*, 61 J. URB. ECON. 319, 343 (2007).

26. *See, e.g.*, Stephen M. Calabrese, Dennis N. Epple & Richard E. Romano, *Inefficiencies from Metropolitan Political and Fiscal Decentralization: Failures of Tiebout Competition*, 79 REV. ECON. STUD. 1081, 1082–86 & n.10 (2012) (explaining when a public good is "fully congested" and giving parks and schools as examples of congested public goods); Wallace E. Oates, *On the Theory and Practice of Fiscal Decentralization*, INST. FOR FEDERALISM AND INTERGOVERNMENTAL REL. 6 (May 2006), http://www.ifigr.org/publication/ ifir_working_papers/IFIR-WP-2006-05.pdf. For evidence of such congestion, see Alain Guengant, Jean-Michel Josselin & Yvon Rocaboy, *Effects of Club Size in the Provision of Public Goods: Network and Congestion Effects in the Case of the French Municipalities*, 81 PAPERS REGIONAL SCI. 443 (2002) (putting forward a theoretical model of congestion effects of public goods in French cities and towns); Michael Reiter & Alfons Weichenrieder, *Are Public Goods Public?: A Critical Survey of the Demand Estimates for Local Public Services*, 54 FINANZARCHIV 374 (1997) (surveying the literature that

non-rivalrous. Perhaps a fixed expenditure needs to be made for a park, and as more people are added to the city the benefit of spreading that expenditure among more people outweighs any congestion effect. But eventually, the congestion effect will take hold. At the margin, it may be that what matters is expenditure per person for many of these goods, rather than total expenditures. This appears to be the case for many such goods.[27]

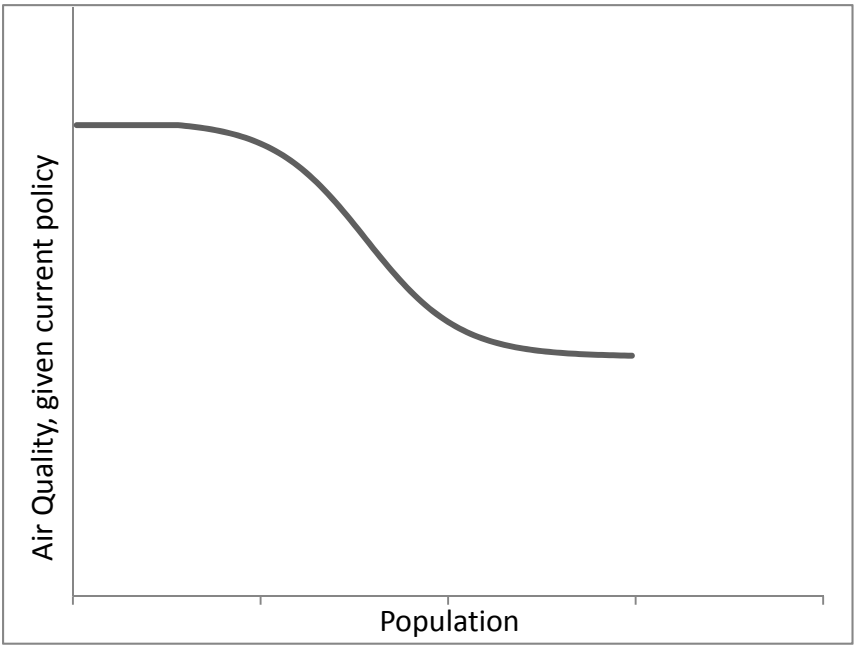

Figure 1A: Effects of Local Population on Local Air Quality

investigates the publicness of government-provided services and finding that such public goods are so crowded they are essentially like private goods); Albert Solé-Ollé & Núria Bosch, *On the Relationship Between Authority Size and the Costs of Providing Local Services: Lessons for the Design of Intergovernmental Transfers in Spain*, 33 Pub. Fin. Rev. 343, 374–76 (2005) (discussing results showing a relationship between population size and costs in Spanish municipalities).

27. *See, e.g.*, Solé-Ollé & Bosch, *supra* note 26, at 374.

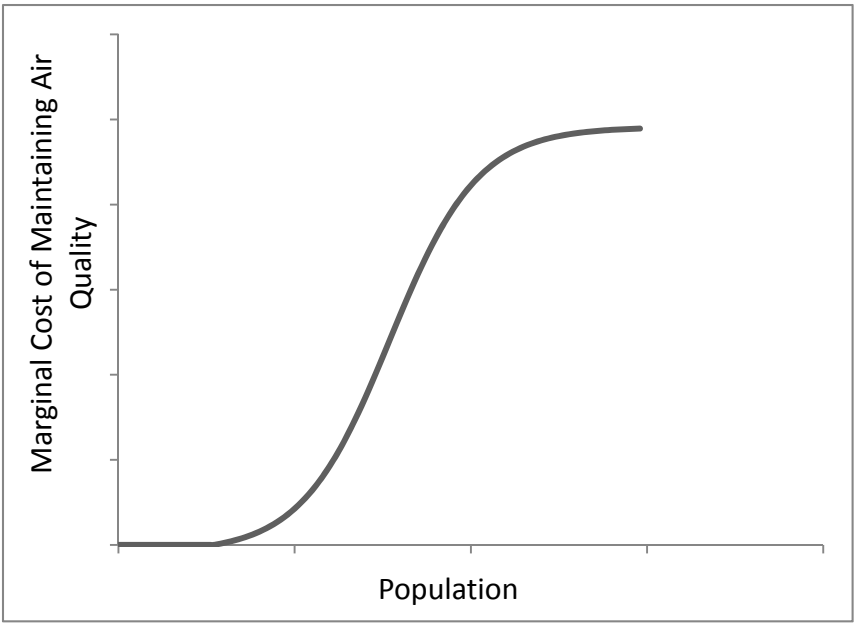

Figure 1B: Effects of Local Population on Cost of Maintaining Local Air Quality

There are two sides to the coin of these congestion effects. On one side, one might say that, holding public expenditures and other policies fixed, the quality of the public good changes with the population size. This relationship is demonstrated in Figure 1A for the example of air pollution. Holding regulations fixed, at first adding more people does not affect air quality, but eventually it does, with air quality declining with population (and the activities that go with that population). On the other side of the coin, one might say that it becomes more costly to maintain a given level of air quality as the population rises. One might need to restrict polluting activities, and these restrictions have costs. This relationship is depicted in Figure 1B.

In the case of congested, rivalrous local public goods like these, it does make sense to exclude some people from enjoying them in any particular location. If too many people tried to pack into a particular jurisdiction, it would create intolerable crowding to the detriment of all, with effects on air quality, open space, and so forth as discussed above.

Of course, if the goods are not congested it would not make sense to exclude people from those public goods—that is, those goods per se. If that were the end of the story, we would conclude that it would make sense to put everybody in Malibu, or in similarly beautiful places (barring congestion effects). However, recall that such amenities are tied, through weak complementarity, to local real estate markets.[28] I

28. *See* discussion *supra* Part I.B.2.

cannot enjoy the climate of a location unless I live there, and I cannot live there unless I have housing there. As noted above, real estate itself is rivalrous. Accordingly, there will be limits to how many people can optimally fit into a site even if there is no congestion of the public good. That is, even if the public good per se is not rivalrous, the bundle of housing and the public good is rivalrous. Thus, even if it does not make sense to exclude people from these amenities per se, it does make sense to limit access to the land that goes with them.

The rivalry, non-rivalry, and weak complementarity of these aspects of the jurisdictional bundle all have implications for the pricing of that bundle. I consider this issue in the following sub-section.

C. The Price People Pay

In a well-functioning market economy, prices reflect the scarcity of resources, and this is no less true of a market for local public goods. In markets for local public goods, the nature of the scarcity varies by the three types of goods discussed in the previous subsection (the real estate, uncongested amenities, and congested local public goods). Consequently, the way prices reflect scarcity varies by these goods as well.

Consider first the real estate in isolation (absent consideration of any locational amenities or public goods). With no locational amenities, there would be nothing distinguishing land in one place from land in another place, so everywhere would have the same price of land (per sq. ft.), reflecting its opportunity cost, which is the value of the land to the person or persons just excluded from using it. Prices for lots would be linear in square footage.

In fact, as we all know from the real estate agent's motto, real estate boils down to three things: "location, location, location." Property is inextricably linked to local amenities in a community. The demand for living in areas that have nice amenities will be higher, and that demand will be reflected in higher real estate values. Since at least the work of David Ricardo in the early 19th century, economists have understood that such amenities are "capitalized" into property values.[29] These higher real estate costs become the price for these amenities. The price of land will be higher in areas with nicer amenities.

In a well-functioning market, prices reflect scarcity. Consequently, just exactly how local amenities and public goods are priced into land should reflect the scarcity of resources. Here, the question of rivalry comes into play again. If they are non-rivalrous, the amenities themselves are not really scarce. But the amenities are inevitably linked to land, and the land itself is scarce and rivalrous—and scarcer where linked to nicer amenities (since demand is higher). Thus, the price of

29. DAVID RICARDO, ON THE PRINCIPLES OF POLITICAL ECONOMY AND TAXATION 52–55 (1817) (focusing on the example of differences in the agricultural fertility of land, which affects the rental prices of land).

uncongested amenities is appropriately reflected in higher land prices. The amenity per se is not priced, but land is pricier per square foot when linked to nicer amenities.

Note a further consequence of these higher land prices. Because, ceteris paribus, people consume less of a thing when it is more expensive, we would expect lot sizes to be smaller as a consequence of these higher real estate prices. This allows more people to crowd into areas with nicer amenities, which is also entirely efficient so long as the amenities remain non-rivalrous.

If the public goods in a community are congested, then access to the public good per se—i.e., access to the community—should be priced, just like membership in a club. But the critical difference is that this scarcity is unrelated to the amount of land consumed. If I move into any given jurisdiction, the burden I impose on its roads, parks, and so forth is unrelated to the amount of land I consume. These prices are like "tickets" for entering a community that fall on the person entering, not the land or housing.

Finally, consider in particular local public goods like schools and parks financed with local taxes. When the taxes supporting these things are added to the equation, the price for purchasing the bundle becomes the gross-of-tax price of property in the community. That is, the tax on top of the price of the land and capital (reflecting the scarcity rents created by locational amenities). *Ceteris paribus*, if members of a community want more public services, they will have to pay for them through higher taxes. The same may be said of amenities produced through local regulations. The regulations have a cost on landowners and residents, no less real than taxes. The cost of residing in a community then becomes the real estate price gross of taxes and regulatory burdens.

These two aspects of the price for local public goods—higher real estate values and higher property taxes or regulatory burdens—come together when we consider two cities, one that is efficiently managed and one that is not. When a city is well managed, it delivers higher quality services and amenities for a given tax burden, making it more desirable. People will move in, reflecting greater demand for housing in that community. That higher demand quickly translates into higher property values. Conversely, when a community is poorly managed, people will move out, driving down property values. These differentials are also reflected in the prices for public goods in this market. Consider two communities with the same tax levy, but one that is efficient and provides a high level of public services with those funds, and another that is inefficient and provides a low level of public services with the same expenditure. If the taxes were the only price paid, everybody would prefer to live in the first community over the second. But this imbalance in supply and demand would translate into a lower price for real estate in the second community: households would require a discount to move into the second community, and that discount is the

lower real estate value. In sum, the price for consuming efficient management as well as the public goods in a local jurisdiction is the gross-of-tax price of real estate.

In his original model, Tiebout accounted for the need for tickets to a community by assuming that jurisdictions use lump-sum taxes, or head taxes.[30] In reality, of course, most jurisdictions use property taxes to fund their public goods. But property taxes are higher for larger lots. Computationally, they just increase the per-unit price of housing. Thus, on the surface, they would appear to price rivalrous local public goods in the same way that higher land prices price non-rivalrous amenities. I take this issue up further in Section III.

For now, it is enough to make the point that, though there is no market in public goods per se, there is a linked market for local public goods. The price in that market is the gross-of-tax housing price. So far, this is just like a private good. Of course, in the case of private goods, an individual can decide whether or not to spend more money for more consumption goods. In the case of local public goods, the members of a community make this decision collectively. However, individual choice is still relevant, because people are free to join or leave the community. In the long run, individuals will live in those communities that most closely fit the level of public expenditure and mix of public expenditures they most desire.

D. When Cities Compete: A Consumer's Menu of Options

As I am arguing that local public goods are not unlike privately provided goods, a reasonable question to ask is how competitive the "market" for such goods is. In this section, I will argue that the market for local public goods is quite competitive, as long as they are in fact locally provided.

When local governments are responsible for providing public goods, people choosing where to live have a greater menu of options available to them. Most metropolitan areas have a large number of local jurisdictions. Some might bemoan this "fragmentation" because it limits coordination.[31] A more optimistic view is that a diversity of local jurisdictions allows a thousand flowers to bloom.

Just how much diversity is there? One way to think about that question is to use measures borrowed from the economics of industrial organization, which are designed to measure the level of competition among firms in an industry. We can similarly use those measures to

30. Tiebout, *supra* note 4, at 417 (referring to a "benefits tax").

31. *See generally, e.g.*, JON C. TEAFORD, CITY AND SUBURB: THE POLITICAL FRAGMENTATION OF METROPOLITAN AMERICA, 1850–1970 1, 33 (1979) (arguing that "[t]he result of this fragmentation is inefficiency, confusion of authority, and disparity in shouldering the burdens of the metropolis").

look at the competition among jurisdictions in a metropolitan area.[32] The top panel of Table 1 shows two measures of competition for a handful of industries. The first measure is the four-firm concentration ratio. It shows the proportion of sales captured by the four largest firms in the industry. The second measure is known as a Herfindahl index. It uses information from all the firms, but is also normalized on a 0 to 1 scale, with 0 representing infinite competition and 1 representing perfect monopoly.[33] As a rule of thumb, an index score below 0.25 is considered competitive. The table shows a wide range of values. The second panel of the table shows these measures for cities, looking at the share of a metropolitan area's housing units accounted for by each jurisdiction. The panel shows the most concentrated of the 50 largest US Metropolitan Statistical Areas (MSAs) (El Paso), the least concentrated (Miami), and selected top-50 MSAs in between.[34] If we think of a metropolitan area as a market, and each city or town as a firm, then the table indicates that local governments are competing every bit as much as private firms in our economy.

32. This idea was first suggested and illustrated by William A. Fischel, *Is Local Government Structure in Large Urbanized Areas Monopolistic or Competitive?*, 34 Nat'l Tax J. 95, 96–99 (1981).

33. For an industry with I firms indexed $\{1 \ldots i \ldots I\}$, and with firm i having a market share of s_i (expressed as a proportion), the Herfindahl index is computed as $\sum_{i=1}^{I} {s_i}^2$. The Herfindahl index consists of the sum of the squares of the market shares in an industry. The index reflects the amount of competition in any given industry, with an index closer to 1 reflecting a decrease in competition, and an index closer to 0 reflecting an increase in competition. An advantage in using the Herfindahl index is that it gives weight to larger firms taking up larger areas of the market.

34. I rank the MSAs by population, excluding any population not in an incorporated place or designated Census place and excluding three MSAs with more than 1/3 of their populations in unincorporated or undesignated places.

	Four-Firm Concentration Ratio	Herfindahl Index
Industry		
Brewing	0.90	0.3680
Breakfast Cereal	0.80	0.2426
Men's Footwear	0.57	0.1059
Book Printing	0.43	0.0646
Soap & Detergent	0.42	0.0904
Fruit & Vegetable Canning	0.26	0.0306
Bolts, Nuts, Rivets, Washers	0.09	0.0030
Metropolitan Areas		
El Paso, TX	0.92	0.728
Houston, TX	0.71	0.396
Phoenix, AZ	0.64	0.179
Milwaukee, WI	0.56	0.196
San Francisco, CA	0.49	0.105
Los Angeles, CA	0.42	0.118
Chicago, IL	0.41	0.132
Cleveland, OH	0.38	0.081
Boston, MA	0.30	0.054
Washington, DC	0.29	0.038
Miami, FL	0.20	0.022

Table 1 Market Concentration in Selected Industries and Cities

Manufacturing concentration ratios and Herfindahl indices from 2007 Census of Manufactures available at www.census.gov, with the exception of the Herfindahl index for brewing, which is from William James Adams, *Markets: Beer in Germany and the United States,* 20 J. Econ. Persp. 189 (2006). *City concentration ratios and Herfindahl indices calculated by the author from* U.S. Census Bureau, 2010 Urban Area to Place Relationship File, *available at* http://www.census.gov/geo/maps-data/data/ua_rel_download.html.

With this wide range of choices, households can better find the community that best fits their needs and tastes. It goes without saying that individual households differ in the relative value they place on different aspects of local consumption bundles and in their willingness

to pay for them. For example, poor households may prioritize private goods like inexpensive housing over public goods, and so are unwilling to live in a high-tax, high-public goods community. In contrast, richer households may be willing (and able) to forego more private goods in order to enjoy more public services and local amenities, and so are willing to pay higher taxes and real estate prices. Too, different individuals might prioritize different public goods. The poor may value local bus services. Families with children may prioritize good schools and community parks. People with asthma may prioritize clean air. And so forth.

In work in Los Angeles, my co-authors and I found that when we defined "communities" as the 105 school districts in the region, there was a wide range of choices available in all these characteristics.[35] We found that

- the mean scores on a California achievement test ranged from 149 to 333;
- annual property and violent crimes ranged from 2.3 per 100 residents to 11.5; and
- days with a violation of air pollution standards ranged from 1 in a typical year to 105.

So when public goods are provided locally, households have a better opportunity to find a good fit for their needs and wants. But having choices means more than just a good match between household tastes and supplied amenities. It means that nobody is beholden to his or her city. If a city performs poorly, people can vote with their feet and leave. As with a competitive market, the possibility that people can choose a competitor disciplines cities to be at their best.

E. Market Discipline

We now come to the final step in the logic. As economist William Fischel has emphasized, a local jurisdiction can be compared to a for-profit corporation.[36] Like a corporation's board of directors that must deliver profits to maximize shareholder value, a municipal corporation's mayors and councilors will be driven to deliver an efficient

35. Holger Sieg et al., *Estimating the General Equilibrium Effects of Large Changes in Spatially Delineated Public Goods*, 45 INT'L ECON. REV. 1047 (2004).

36. WILLIAM A. FISCHEL, THE HOMEVOTER HYPOTHESIS: HOW HOME VALUES INFLUENCE LOCAL GOVERNMENT TAXATION, SCHOOL FINANCE, AND LAND-USE POLICIES 19 (2001); William A. Fischel, *A Theory of Municipal Corporate Governance with an Application to Land-Use Regulation*, *in* A COMPANION TO URBAN ECONOMICS 372 (Richard J. Arnott & Daniel P. McMillen eds., 2006).

government and appropriate mix of public goods to maximize its property values. Moreover, the shareholders of the municipal corporation are much more likely to actively monitor and police municipal leaders. Homes are by far the single most important investment for most people. Homeownership rates are still about 65.4% (down from a high of 69.1% before the Great Recession) and up to eighty percent of Americans own a home at some point in their lives.[37] Moreover, even after the recent housing bust, the typical home-owning household has forty-nine percent of its wealth tied up in its home.[38] From an investment perspective, this means most homeowners have a lot of their wealth in one basket, and they are wise to watch that basket very carefully.[39]

Thus, the "price" for public goods really plays a dual role. On the one hand, it is the price for joining the "club" of a jurisdiction and enjoying its local public services. As with private goods, this price efficiently allocates services to those households that are willing to pay for them. On the other hand, the price here also is an asset for those households who have already purchased their membership in the jurisdiction, which provides an incentive for them to maximize their property values by ensuring their jurisdiction is efficiently run.

And the evidence is that homeowners do just that. One survey found that homeowners were more likely to know the school superintendent, know their U.S. House Representative, vote in local elections, and participate in community organizations; moreover, the same individuals appear to be more active citizens in this regard once they become homeowners.[40] In this way, citizens have a stake in the success of their communities and they actively oversee local politics to ensure that success.

F. Empirical Evidence

There is ample evidence that a robust market is at play in just this way. My colleague Randall Walsh and I recently looked at the demographic effects around large industrial facilities with high levels of

37. Press Release, Robert R. Callis & Melissa Kresin, U.S. Census Bureau News, Residential Vacancies and Homeownership in the Fourth Quarter 2012 (Jan. 29, 2013), *available at* http://www.census.gov/housing/hvs/files/qtr412/q412press.pdf.

38. This figure was computed by dividing the 2011 mean value of equity in owner-occupied homes, among homeowners, by the mean net worth of homeowners. *See Detailed Tables on Wealth and Asset Ownership*, U.S. CENSUS BUREAU, http://www.census.gov/people/wealth/data/dtables.html (follow "2011" hyperlink; then select Table 5) (last visited Mar. 3, 2014).

39. Fischel, *supra* note 36.

40. Denise DiPasquale & Edward L. Glaeser, *Incentives and Social Capital: Are Homeowners Better Citizens?* 45 J. URB. ECON. 354, 356 (1999).

air pollution. We looked at very local effects in small neighborhoods defined at a scale of a half-mile. We found that neighborhoods within a half mile of these polluting facilities lost 10–12 percent of their population between 1990 and 2000, compared to other neighborhoods. Neighborhoods with a new polluting facility lost 8–12 percent of their population. And neighborhoods where the polluting facility either shut down or substantially cleaned up had a 4–6 percent *increase* in population compared to other neighborhoods.[41]

Some may object on the grounds that it seems unlikely people would move just because of small changes in public goods or tax rates. In fact, we do find greater turnover in neighborhoods following these kinds of changes in their character (for good or ill). But more importantly, it isn't really necessary for people to move *because* of such changes. People move anyway, with over thirty-five percent of Americans moving in a five year period, a very high rate.[42] This mobility creates a constant churning that allows the demographic composition of communities to evolve rapidly along with changing public services. So long as people look at amenities, taxes, and housing prices when they *do* move, the demand for housing will be systematically higher in well-run communities. It is also worth noting that the distribution of job locations does not appear to restrict households' choices about where to live within a metropolitan area. We seem quite willing to commute if necessary to obtain our preferred residential community.[43]

In addition to turnover and other such demographic adjustments to changes in public goods, there is strong evidence that the higher demand for public goods is "capitalized" into higher housing prices. By the same token, lower demand for a community translates into lower prices. For example, nobody likes to pay taxes. So intuitively, communities with higher tax burdens are less desirable, other things equal. But estimating this effect empirically requires overcoming some statistical challenges, because higher taxes tend to go with higher expenditures on services. Consequently, it is not enough to just compare housing prices in high-tax communities to prices in low-tax communities.

However, economists have identified the effect by focusing on cases where higher taxes are paid without a corresponding increase in services. For example, one study compared otherwise identical houses in a Houston subdivision, but which differed in the year that they were

41. H. Spencer Banzhaf & Randall P. Walsh, *Do People Vote with their Feet? An Empirical Test of Tiebout's Mechanism*, 98 AM. ECON. REV. 843 (2008).

42. *Data on Geographical Mobility/Migration*, U.S. CENSUS BUREAU, http://www.census.gov/hhes/migration/data/cps/cps2010-5yr.html (follow "Table 1: United States" hyperlink) (last visited Mar. 3, 2014).

43. Bruce W. Hamilton, *Wasteful Commuting*, 90 J. POL. ECON. 1035 (1982).

built. Because prevailing interest rates changed over time, even many years later taxes to pay down debt on water and sewer infrastructure were different for these houses. And these differences were capitalized into the housing prices.[44] Other studies have found that older homes in California, exempt from higher taxes under the state's Proposition 13 but still entitled to full schooling and other services, command a price premium over newer homes with higher tax rates.[45] Even *future* tax liabilities appear to be capitalized into housing values: one study found that greater municipal pension liabilities are associated with lower housing values.[46]

On the other side of the coin are the amenities and public services we enjoy. In the same way that taxes are associated with lower housing prices, high-quality public goods and natural amenities are associated with higher prices. Intuitively, we all understand that houses are more expensive in a strong school district than in a weaker one. In two recent studies conducted in Massachusetts and San Francisco, economists have compared homes just on one side of a school attendance zone to homes just across the boundary. Comparing communities, they found that a five percent improvement in test scores leads to a one-to-two percentage point increase in housing prices.[47] If anything this seems low, but there are reasons to suspect these estimates may well be a lower bound on the effect of schools on property values, if households feared that the attendance zones would change in the future.[48] Crucially, these capitalization effects occur for environmental amenities as well as for school quality. For example, communities with five percent less air pollution are associated with a two percent increase in housing prices.[49]

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44. Oded Palmon & Barton A. Smith, *New Evidence on Property Tax Capitalization*, 106 J. POL. ECON. 1099 (1998).

45. A. Quang Do & C. F. Sirmans, *Residential Property Tax Capitalization: Discount Rate Evidence from California*, 47 NAT'L TAX J. 341 (1994).

46. Dennis Epple & Katherine Schipper, *Municipal Pension Funding: A Theory and Some Evidence*, 37 PUB. CHOICE 141 (1981).

47. Patrick Bayer et al., *A Unified Framework for Measuring Preferences for Schools and Neighborhoods*, 115 J. POL. ECON. 588 (2007); Sandra E. Black, *Do Better Schools Matter?: Parental Valuation of Elementary Education*, 114 Q. J. ECON. 577 (1999). For an alternative approach to estimating such capitalization, see Dennis Epple & Holger Sieg, *Estimating Equilibrium Models of Local Jurisdictions*, 107 J. POL. ECON. 645 (1999).

48. Chris Mothorpe, The Impact of Uncertainty on School Quality Capitalization Using the Border Method (October 2013) (unpublished manuscript), *available at* http://aysps.gsu.edu/sites/default/files/documents/The%20Impact%20of%20Uncertainty%20on%20School%20Quality%20Capitilization%20Using%20the%20Border%20Method.pdf.

49. Patrick Bayer et al., *Migration and Hedonic Valuation: The Case of Air Quality*, 58 J. ENVTL. ECON. & MGMT. 1 (2009); Kenneth Y. Chay &

Additionally, numerous studies document that housing prices are lower near landfills and hazardous waste sites.[50]

More interestingly, in all these cases—education, air quality, and hazardous waste—new information or new reforms leads to sudden changes in local housing prices. For example, in recent work I have shown that a perceived break-up of the enormous, unwieldy, and much-loathed Los Angeles Unified School District led to a two-to-five percentage point increase in housing prices in the district over the following six months, compared to nearby areas.[51]

Similarly, from 1999–2001, an outbreak of fifteen cases of acute lymphocytic leukemia occurred in Churchill County, NV, out of a total population of about 24,000, about four times the typical level.[52] As Lucas Davis has shown, this "cancer cluster" led to a substantial decline in housing prices, of about fifteen percent, right after the publication of these cases.[53] The following figure illustrates this effect. These kinds of rapid capitalization effects indicate that people are playing close attention to local conditions, and that they respond to those conditions by voting with their feet.

Michael Greenstone, *Does Air Quality Matter? Evidence from the Housing Market*, 113 J. POL. ECON. 376 (2005).

50. *See generally* H. Spencer Banzhaf & Eleanor McCormick, *Moving Beyond Cleanup: Identifying the Crucibles of Environmental Gentrification*, *in* THE POLITICAL ECONOMY OF ENVIRONMENTAL JUSTICE 23 (H. Spencer Banzhaf ed., 2012).

51. H. Spencer Banzhaf & Garima Bhalla, *Do Households Prefer Small School Districts?: A Natural Experiment*, 78 S. ECON. J. 819, 837 (2012).

52. Lucas W. Davis, *The Effect of Health Risk on Housing Values: Evidence from a Cancer Cluster*, 94 AM. ECON. REV. 1693, 1694 (2004).

53. *Id.* at 1701–02.

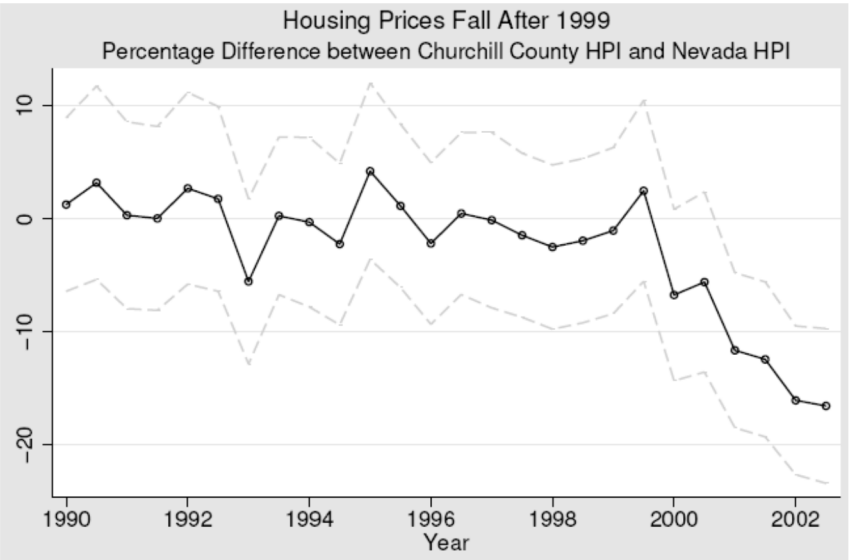

Figure 2: Effect of 1999–2001 Cancer Cluster on Housing Prices in Churchill County, NV Compared to Control Group

Source: Lucas W. Davis, The Effect of Health Risk on Housing Values: Evidence from a Cancer Cluster 94 American Economic Review 1693 (2004).

So far we have considered two kinds of evidence that a market is at work in public services: direct mobility by households and capitalization of amenities, services, and taxes into housing prices. A third and final type of evidence is more indirect. A general rule of markets is that, for obvious reasons, richer people tend to buy more of the good things in life. By the same token, numerous studies have shown that richer households live in more expensive communities with higher levels of public goods.[54] Others have found that metropolitan areas with more school districts are more segregated by income levels across districts.[55] This makes sense: where there is a monopoly, everybody has to buy the same product; where there is more choice, different people choose different products. That is, people sort themselves out by their demand for public goods when given the opportunity to do so. Markets for public goods look like markets for private goods, with richer people able to afford to purchase more of the good things in life.

54. Epple & Sieg, *supra* note 47, at 648, 671; Sieg et al., *supra* note 35, at 1067.

55. Randall W. Eberts & Timothy J. Gronberg, *Jurisdictional Homogeneity and the Tiebout Hypothesis*, 10 J. Urb. Econ. 227, 238 (1981).

In summary, because of market incentives, better-run cities have higher property values and a larger tax base. They get it right in two ways. First, efficient cities get the most services for their tax dollar. Second, they hit the sweet spot in the trade-off between the benefits of public services and the cost of taxes. A city with very low taxes but very low services will struggle with crime, school quality, potholes and other issues, and citizens will be willing to pay higher taxes to obtain those services. Another city might go too far in the other direction, taxing away a dollar to pay for excessive services that citizens value less than a dollar. The best-run city will strike the right balance for its citizens.

III. POTENTIAL FLIES IN THE OINTMENT

In the previous section, I argued that local public goods can be efficiently provided, just like private goods. Households must purchase them at a price, just as they do private goods. And local governments have an incentive to efficiently provide them, as private corporations do for private goods. In this section, I consider three potentially important caveats to this argument, two related to the types of taxes used to finance local public goods and one related to renters.

A. Property Taxes

The first fly in Tiebout's ointment—and the one of particular concern in this paper—is the fact that, realistically, jurisdictions cannot use head taxes to finance public goods. Instead, they must use an alternative fiscal instrument such as the property tax or a land tax. This in turn gives rise to two potential problems.

1. Jurisdictional Choice Externalities

The first potential problem is a "jurisdictional choice externality," in which too many people try to crowd into a community when they do not bear the full cost of public services.[56] As discussed in Section II.B, this dynamic is problematic if public goods are congested, so that when an additional household enters a jurisdiction it either subtracts from the benefit received by others or requires additional funding or regulation.

A jurisdictional choice externality can arise in at least two ways. The first way this can arise is if there are increasing marginal costs of serving an additional resident with a given level of the public good. Suppose, for example, as discussed previously, the marginal cost of maintaining a given level of air quality in a community is increasing. (At first, adding additional population has little effect, but then increasingly severe regulatory burdens would be required to maintain a given level of air quality.) This situation is again depicted in Figure 3.

56. The idea is an old one, but to my knowledge the term was coined by Calabrese et al., *supra* note 26, at 1082.

The optimal population size for the community is at the first vertical line, where the marginal benefits to households of living in the jurisdiction (the horizontal dashed line) are just equal to the marginal cost of adding an additional household (the solid curve).

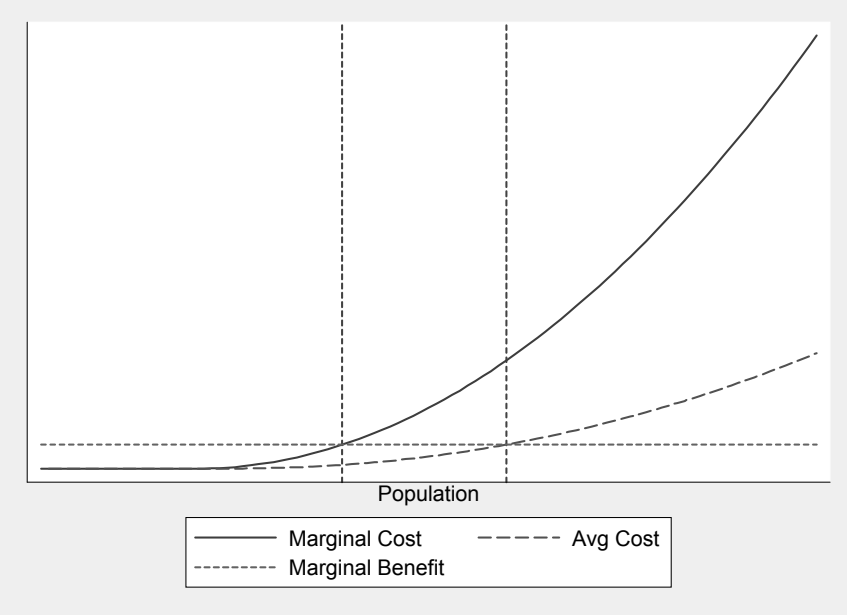

Figure 3. Jurisdictional Choice Externality

However, the tax and/or regulatory burdens of maintaining the public goods are evenly distributed among all members of the jurisdiction. Accordingly, households do not pay the marginal cost, they pay the average cost (the dashed curve). At the optimal population size, the marginal benefit to an additional household of moving into the jurisdiction is higher than the average cost, so more households would continue to move in, until the marginal benefit is equal to the average cost, at the second vertical line. But these additional households impose a cost on the community that is much higher than the benefit they receive from living there. It is this burden on others which is meant by the jurisdiction choice externality and which can potentially lead to overcrowding.[57] If head taxes were available, they could serve to price

57. *See* William A. Fischel, The Economics of Zoning Laws: A Property Rights Approach to American Land Use Controls 294–96 (1985) (describing the costs and benefits associated with an increase in population).

the congestion imposed by other people and limit entry, but property taxes are a blunt way to do this, as they tax property, not congestion.[58]

Even if marginal costs and average costs are constant, so that there is no divergence between the two as depicted in Figure 3, there is a second way the jurisdictional choice externality can arise. The second way a jurisdictional choice externality can arise is when poorer households try to buy small houses in richer neighborhoods. In such cases, the entry into the community of a resident transfers funds from richer households (with larger houses and, hence, greater property tax burdens) to poorer households. In this way, poorer households are essentially free riding (or "easy riding"[59]) off richer houses in the financing of public goods. Although they get the same parks and schools as the richer residents in the community, they pay less because they consume less real estate.

Because they are subsidized by richer households in the jurisdiction, poorer households will vote for higher public good levels. Unfortunately, by the same token, because public goods would thereby serve as a transfer payment rather than a pure public good, richer households will respond by voting for lower tax rates and public good levels. Alternatively, they may leave the jurisdiction altogether. This creates a potential dynamic in which poorer households chase richer ones and richer ones try to flee. The upshot of the problem is that public goods financing becomes a redistributive transfer. And though the provision of public goods has the potential to work well locally, a standard result in public finance is that income transfers do not.[60]

The jurisdictional choice externality can be viewed as a case of the "tragedy of the commons," with too many people crowding into a jurisdiction to take advantage of its tax base.

2. Capital Distortions

A second potential problem, highlighted by proponents of the so-called "new view" of the property tax, is that the property tax distorts the allocation of capital, with residents in high-tax communities building less intensively in response to the tax.[61] If so, this would change

58. A blunt way, but not totally ineffectual. *See* John Douglas Wilson, *Property Taxation, Congestion, and Local Public Goods*, 64 J. PUB. ECON. 207, 208 (2007).

59. CORNES & SANDLER, *supra* note 2, at 30.

60. OATES, *supra* note 3, at 190 ("[T]he mobility of economic units prevents any particular locality from embarking on an aggressive redistributive program because of the likelihood that those from whom income is being transferred will relocate in areas where they can obtain more favorable fiscal treatment.").

61. Peter Mieszkowski, *The Property Tax: An Excise Tax or a Profits Tax?*, 1 J. PUB. ECON. 73, 74 (1972). *See generally*, George R. Zodrow, *Reflections of the New View and the Benefit View of the Property Tax*,

the interpretation of the price people pay for public goods. Insofar as it includes property taxes, the price would not be just a way to allocate public goods to the households with the highest willingness to pay, while covering the cost of supplying public goods. In other words, it would not be a "benefit tax"—a price paid for the benefits of public goods. It would distort other, unrelated decisions, like how large a house to build on the land.

In a recent simulation exercise, Stephen Calabrese and co-authors have found that both issues are problematic, but that the jurisdictional choice externality is the greater concern.[62] In fact, in their simulations, the jurisdictional choice externality entirely negates any gain from Tiebout sorting processes, with households better off with a single community—that is, with no menu of choices over taxes and public good levels. Nevertheless, elements of the Tiebout model remain even with these distortions.[63] In particular, under certain conditions, households still sort across communities based on their demand for public goods and public good levels will be capitalized into housing prices.

Note that both these potential problems stem from the use of the property tax. If head taxes were available, as Tiebout originally envisioned, the transfer would not occur. Poorer households would pay the same as richer households, regardless of their housing consumption. Similarly, the congestion would not occur. The head tax would serve as a congestion tax, serving as a mechanism to exclude over-consumption of the local public good by pricing entry. That is, while the head tax serves as the club "gate," the property tax seemingly distorts housing consumption. For that reason, the taxes in Tiebout's model are sometimes called a "benefit" tax, they are a price paid to receive the benefits of living in a community, whereas under the "new" view the tax falls on capital.

B. Renters

Although it is not the centerpiece of this paper, another set of potential problems with Tiebout's defense of local public goods is the role of renters. As discussed above, when citizens are homeowners, they

in PROPERTY TAXATION AND LOCAL GOVERNMENT FINANCE: ESSAYS IN HONOR OF C. LOWELL HARRIS 79 (Wallace E. Oates ed., 2001). One alternative to the property tax that would not have this second problem is the land tax. *See, e.g.*, LAND VALUE TAXATION: CAN IT AND WILL IT WORK TODAY? (Dick Netzer ed., 1998).

62. Calabrese et al., *supra* note 26, at 1083.

63. *See* Dennis Epple et al., *Equilibrium Among Local Jurisdictions: Toward an Integrated Treatment of Voting and Residential Choice*, 24 J. PUB. ECON. 281, 282 (1984); George R. Zodrow & Peter M. Mieszkowski, *The New View of the Property Tax: A Reformulation*, 16 REGIONAL SCI. & URB. ECON. 309, 313 (1986).

have an important incentive to monitor their community and insure that it is efficiently run. That incentive is to maintain their property values. However, although the majority of Americans are homeowners, about a third are renters.[64] In many cities, the proportion is much higher, ranging up to about half in New York and Los Angeles (the highest in the U.S.).[65] And, indeed, renting is a perfectly logical choice for households who are credit constrained, who may expect to move in the near future and do not want to pay the transaction costs of buying and selling a house for a short tenure, or who otherwise do not want to bear the risk of owning such a large financial asset.

Recall that the price of land plays a dual role in our argument. The first is its role in allocating local public goods. In this respect, renters pay the same kind of price that homeowners do to enter a community. For the same reason we expect property values to be higher in cities with nice amenities, we expect rents to be higher too. This means that the price mechanism still works for allocating public goods to renters as well as to homeowners. However, the second role played by the price is as an incentive to insure that cities are efficiently run. Here, the logic breaks down in the case of renters. If inefficiency causes local taxes to be higher without a compensating increase in services, renters will simply require lower rents to live in the city.[66] Landlords will be worse off, but the renters will be indifferent to the inefficiency.[67] This is consistent with the evidence that renters are less informed about local politics.[68] Unfortunately, it means that cities with large numbers of renters may not be run as efficiently.

IV. THE ROLE OF ZONING

In this section, I will argue that despite the potential problems posed by congested public goods and the property tax, discussed in the previous section, local zoning and other ordinances can restore the competitive efficiency of local public goods.

64. Press Release, U.S. Census Bureau, *supra* note 37, at 4 tbl.3.

65. *Homeownership Rates for the 75 Largest Metropolitan Statistical Areas: 2005 to 2013*, U.S. CENSUS BUREAU, http://www.census.gov/housing/hvs/data/rates/tab6_msa_05_2013_hmr.xls (last visited Mar. 1, 2014).

66. H. Spencer Banzhaf & Wallace E. Oates, *On Fiscal Illusion in Local Public Finance: Re-Examining Ricardian Equivalence and the Renter Effect*, 66 NAT'L TAX J. 511, 513–14, 532–34 (2013); Jorge Martinez-Vazquez & David L. Sjoquist, *Property Tax Financing, Renting, and the Level of Local Expenditures*, 55 S. ECON. J. 424, 429 (1988).

67 Martinez-Vazquez & Sjoquist, *supra* note 66, at 428.

68. DiPasquale & Glaeser, *supra* note 40, at 356.

A. Prices under the Consensus View

As a matter of logic, if—and as I will argue below, this is a big "if"—housing capital and lot sizes quickly adjust to new conditions, then land and housing prices will be approximately equal within a jurisdiction in equilibrium, regardless of any distortions in the number of residents and size of housing. If small lots were more valuable per unit than large lots, lots would be readjusted so that there would be more small ones. Low-value land added to larger lots would be removed and used to create new small lots. If the reverse were true and large lots were more valuable per unit than small lots, small lots would be merged to increase the total value.

Accordingly, in what Ross and Yinger call the "consensus view," land will have a constant price within a community, but be more expensive (gross of taxes) in high-public-good communities.[69] The relationship is illustrated in Figure 4A. Here, all prices go through the origin (an infinitesimally small lot has infinitesimal value), but the marginal cost of a larger house is higher in high-public-good communities. Algebraically, the price of a lot i, of a given size, in community j can be written:

$$(1) Price_{ij} = a_j * size_{ij}$$

The term a_j represents the community-specific cost of land, which is increasing in public goods; it represents the slope of the lines in Figure 4A. In other words, from this perspective, there is no distinction between the pricing of uncongested or congested public goods as we made in Section II.B. Both types of public goods are capitalized in the gross-of-tax price of the weak complement, real estate.

69. Stephen Ross & John Yinger, *Sorting and Voting: A Review of the Literature on Urban Public Finance*, in 3 HANDBOOK OF REGIONAL AND URBAN ECONOMICS 2001, 2027 (Paul Cheshire & Edwin S. Mills eds., 1999).

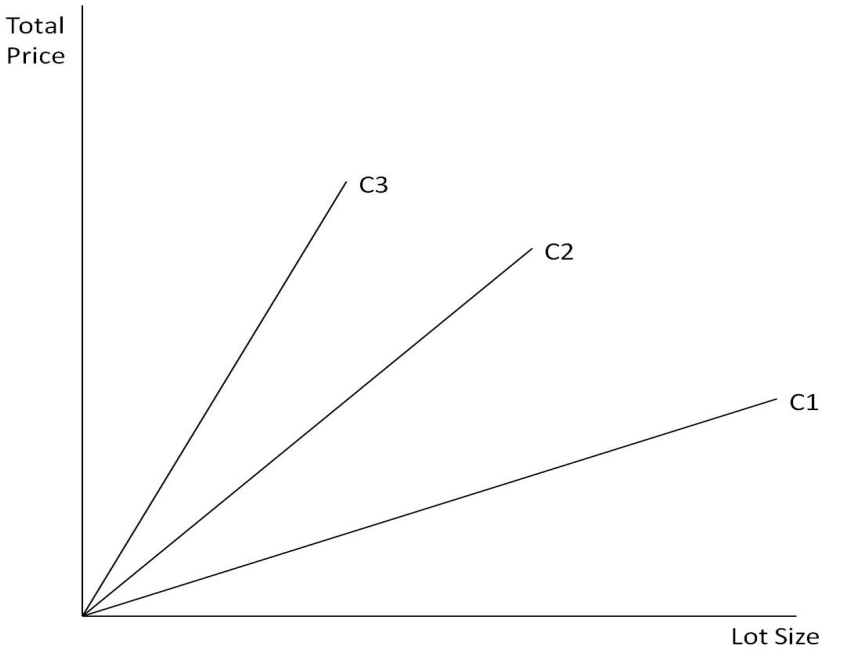

Figure 4A: Pricing in Consensus View

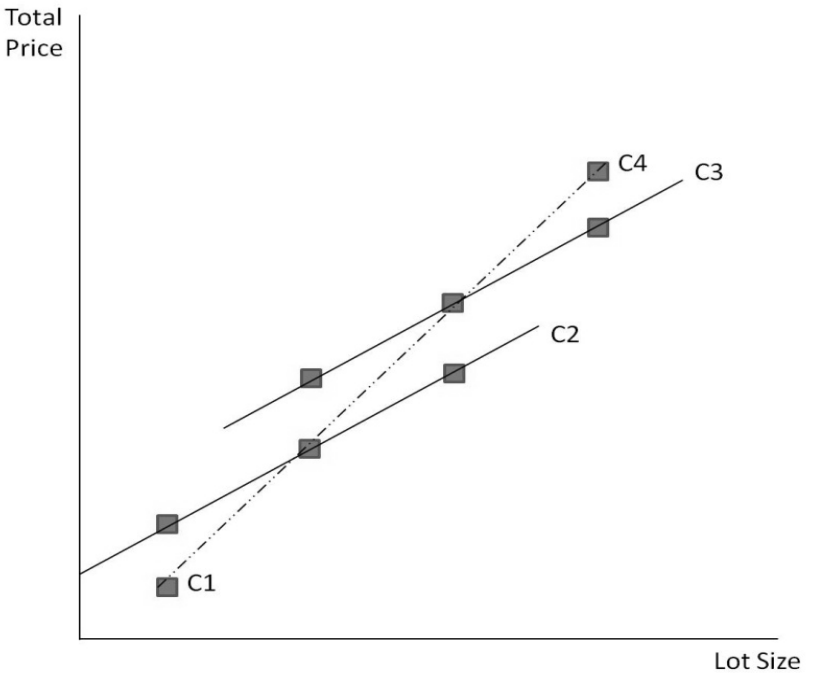

Figure 4B: Pricing under Hamilton (1976)

But these are precisely the conditions discussed in the previous section that seem to undermine Tiebout's argument that there is a market-like process in public goods. These are the conditions that lead to the jurisdictional choice externality and capital distortions discussed above. Namely, there is no gate price for entry to the community, only marginal pricing for capital.

B. Prices as a Two-Part Tariff

Bruce Hamilton extended Tiebout's model to account for the distortions otherwise caused by the unavailability of head taxes and to lend the benefit interpretation to property taxes (or regulations). In the simplest version of the argument, he noted that zoning regulations, such as minimum lot sizes or height restrictions, can prevent such distortions by preventing too many people from crowding into a community: with lot sizes fixed, there is a limit to how many housing units could fit in a jurisdiction.[70] Similarly, zoning restrictions on housing units can prevent capital distortions. Minimum house sizes (or minimum standards for the quality and style of construction) can prevent the distortion of the property tax, which otherwise would lead to lower levels of housing capital.

In a variant of his argument, Hamilton also noted that the same outcome could arise even with heterogeneity in lot sizes, as long as the distribution of houses was fixed.[71] For example, a jurisdiction might reserve a certain share of housing for "small" houses (or low-income housing) and zone the remainder for "large" houses. Or, perhaps a range of lot sizes and house sizes emerged in a jurisdiction historically, for whatever reason, but those configurations remain largely fixed over very long time periods because of transaction costs. Once parcels are subdivided at some point in history, it is quite costly to change those divisions, especially if housing capital and infrastructure are already developed.

Figure 4B illustrates this second variant of Hamilton's model. The point labeled C1 represents a homogenous community of all small houses; likewise the point C4 represents a homogenous community of all big houses. C2 and C3 represent communities with mixed housing bundles, but in which the quantity of each house type is zoned (or otherwise fixed). In both mixed communities, larger houses must be more expensive than smaller houses. But a small house in C2 has an advantage over an equal-sized house in C1 because it enjoys the tax base of the larger houses in C2. Hence, it is more expensive. By the same token, the large house in C3 has a *disadvantage* relative to a

70. Bruce W. Hamilton, *Zoning and Property Taxation in a System of Local Governments*, 12 URB. STUD. 205 (1975).

71. Bruce W. Hamilton, *Capitalization of Intrajurisdictional Differences in Local Tax Prices*, 66 AM. ECON. REV. 743, 747–49 (1976). For discussion, see FISCHEL, *supra* note 36, at 39–71.

comparable house in C4 because it must subsidize public goods for residents pulling down the tax base. Hence, it is less expensive. Likewise for a comparison of houses across C2 and C3. The crucial consequence of all this is a *tilting* of the marginal cost of land within C2 and C3: even if the marginal cost of land is constant within a community, as illustrated here by the straight lines connecting the points, *the average cost (i.e. total cost divided by the lot size) is not constant.* Mathematically, prices must be computed with a community-specific intercept as well as a (constant) cost of land: *(2)* $Price_{ij} = \alpha_j + a_0 * size_{ij}$, where here the α_j are increasing in public goods. Under optimal zoning, if all land is of constant quality, a_0 is the same everywhere. For reasons discussed above, if the non-rivalrous amenities differ, the *a*'s will still differ across communities, as would be appropriate to account for the scarcity of land.

This "tilting" in the price functions has at least three interpretations. First, as explained by Hamilton, zoning plays the role of a head tax.[72] Although there is no head tax per se, households still must pay a fixed entry "ticket" to the community through the housing price, followed by a marginal cost for larger lots.[73] Each jurisdiction will have its own "ticket" price that internalizes the congestion externality at that location. A second interpretation comes from the literature on nonlinear pricing.[74] A well-established result in that literature is that minimum purchase requirements are equivalent to a two-part tariff: here, the two parts are the entry fee plus the marginal price of land.[75] Such pricing schemes are optimal whenever there is a fixed cost of serving an additional customer (such as the jurisdictional choice externality).[76] A third interpretation comes from the literature on shadow pricing and rationing.[77] When some households are rationed into larger houses than they would otherwise choose, the equilibrium can be supported "as if" by a lower cost of land, paired with a downward adjustment to income to offset the income effect of those lower prices. This adjustment to "virtual income" is equivalent to the entry ticket.

72. *See* Hamilton, *supra* note 71 at 749.

73. *Id.* at 750.

74. *See generally* ROBERT WILSON, NONLINEAR PRICING 136–41 (1993) (discussing the nonlinear pricing and the two-part tariff).

75. *Id.*

76. *See id.* at 136.

77. *See generally* J.P. Neary & K.W.S. Roberts, *The Theory of Household Behaviour under Rationing*, 13 EUR. ECON. REV. 25 (1980) (discussing how duality theory and virtual prices can be used to analyze household behavior under rationing).

C. Empirical Evidence

A large literature has debated the relative merits of the assumptions of these models and purported to empirically test one or the other.[78] Unfortunately, many of these tests are unsatisfying.[79] Consider, for example, the issue of capitalization. Some argue that "capitalization is everywhere" and that this is consistent with the benefit view.[80] Others argue that capitalization is still consistent with the new view of the property tax, insofar as it incorporates Tiebout-like sorting processes.[81] Still others have gone farther and argued that, since in Hamilton's model the price of homogenous land is constant everywhere, evidence that housing prices capitalize public good levels *contradicts* the benefit view.[82] Indeed, Ross and Yinger call such evidence "overwhelming."[83]

In fact, the participants in this debate appear to be talking past one another. The question is not really *whether* public good levels are capitalized, but *how* they are capitalized. In the consensus view, the α_j of Equation (2) are all zero: there are no entry tickets, no intercepts as in Figure 4B. Capitalization occurs only through slope effects, as in Figure 4A. As discussed in Section II, that kind of pricing is perfectly appropriate if public goods are uncongested. But if public goods are congested, that kind of pricing fails to close the commons and leads to overcrowding of the community. Under Hamilton's model, with optimal zoning and homogenous land (and no uncongested public goods), the marginal price of land is the same everywhere: the a_j of Equation (1) are all equal. Capitalization occurs through the intercepts as in Figure 4B, as would be appropriate for congested public goods. Thus, the question should be whether capitalization reveals itself in a higher

78. *See* FISCHEL, *supra* note 36, at 39–71; William A. Fischel, *Municipal Corporations, Homeowners and the Benefit View of the Property Tax*, *in* PROPERTY TAXATION AND LOCAL GOVERNMENT FINANCE: ESSAYS IN HONOR OF C. LOWELL HARRIS 33 (Wallace E. Oates ed., 2001) (discussing the merits of the benefit view); Zodrow, *supra* note 61 (discussing the merits of the new view); Thomas J. Nechyba, *The Benefit View and the New View: Where Do We Stand, Twenty-Five Years into the Debate?*, *in* PROPERTY TAXATION AND LOCAL GOVERNMENT FINANCE: ESSAYS IN HONOR OF C. LOWELL HARRIS 113 (Wallace E. Oates ed., 2001) (comparing the different views taken by the Zodrow and Fischel models); Ross & Yinger, *supra* note 69 (presenting evidence in support of the new view).

79. *See* Nechyba, *supra* note 71.

80. Fischel, *supra* note 79, at 56.

81. *See* Zodrow, *supra* note 61, at 91; Nehyba, *supra* note 79, at 119 (stating that there is a role for capitalization in either view).

82. Ross & Yinger, *supra* note 69, at 2018–19.

83. *Id.* at 2043.

marginal cost of land or a fixed entry ticket; whether it is in the slopes of Figure 4A or the intercepts of Figure 4B or a little bit of both.

Unfortunately, to my knowledge, virtually *all* of the papers that been interpreted as disproving the benefit view do so only under maintained hypotheses that rule out the two-part pricing inherent in Hamilton's model.[84] Most notably, this includes any hedonic study, such as all those discussed by Ross and Yinger, that uses logged housing prices as the dependent variable. In all such models, the price of a unit of housing is constant in each community and given by a_j (recovered as the exponent of the community-specific intercepts in the semilog model).[85] Although some of these models do allow for flexible functional form relationships between prices and housing quantity, invariably the studies interpret the flexible function of land and capital as a non-linear quantity index of housing, with the exponentiated community-specific intercepts as the constant price-per-unit of this quantity index.[86] Thus, the models either literally force a linear price through the origin as in Figure 4A, or rescale the axis-axis so that is true in renormalized "quantity space."

Accordingly, these models cannot be viewed as proper tests of Hamilton's model, because if the benefit view as articulated by Hamilton is correct, then they are mis-specified because they rule out the tilting shown in Figure 4B. Simply by eyeballing this figure, it is obvious that if one fits Equation (1) to it, one will force capitalization into the price function. Indeed, I have found in simulations that a semilog model can obtain a very strong fit, even to data that are generated from a Tiebout-Hamilton-Fischel process, with uniform marginal prices of land across jurisdictions and entry tickets. A similar issue arises in the model of Carroll and Yinger, which again restricts the price of housing to be constant.[87] None of this is to say that we have

84. For discussion of an important exception, see Byron F. Lutz, *Fiscal Amenities, School Finance Reform and the Supply Side of the Tiebout Market* (Fed. Res. Bd., Working Paper No. 2009-18, 2009). Lutz finds that decreases in the fiscal transfers within a community result in increases in housing capital. *Id.* at 23–25, 28–29. On the face of it, this is inconsistent with a simple zoning story in which capital is fixed. However, this too is not a clean test. For example, it may not be inconsistent with a story in which jurisdictions have *minimum* constraints on housing size, constraints which may over time either no longer bind or be adjusted upward to bind at a higher level of capital.

85. For an overview of this literature, see H. Spencer Banzhaf & Omar Farooque, *Interjurisdictional Housing Prices and Spatial Amenities: Which Measures of Housing Prices Reflect Local Public Goods?*, 43 REGIONAL SCI. & URB. ECON. 635 (2013). For prominent examples, see Bayer et al., *supra* note 49; Sieg et al., *supra* note 35.

86. *See* sources cited *supra* note 85.

87. Robert J. Carroll & John Yinger, *Is the Property Tax a Benefit Tax?: The Case of Rental Housing*, 47 NAT'L TAX J. 295, 305 (1994).

not gained important insights from these models. But insofar as they rule out the benefit view by assumption, they are not tests of that view, properly speaking.

A second fact that has been suggested to undermine the benefit view is the surprising degree of income heterogeneity within jurisdictions, which is greater than one might expect if the jurisdictional choice externality were being controlled with zoning. Empirical sorting models, for example, explain this result with dispersed distributions of unobserved tastes for public goods, tastes which often are estimated to be slightly negatively correlated with income.[88] However, this result may be forced on the models through the mis-specification of assuming price relationships like Figure 4A. Essentially, the models must confront the fact that some households are (seemingly) willing to live in a community with low public goods along with poorer households yet are rich enough to afford a very large house at constant prices. The models explain this by assigning them low tastes for public goods, so that they are not willing to join a richer community, and high income. However, an alternative explanation, consistent with Hamilton's model, is that in fact they are paying a lower price for per-unit housing in that community than assumed by the model, as illustrated by Figure 4B. That is, perhaps some richer households are in lower-ranked communities, not because of a low unobserved taste for public goods, but because they pay less for the large houses there (per unit).

There is no doubt some truth to both the benefit view and the new view.[89] Accordingly, in this paper I account for both through the following model: $(3) Price_{ij} = \alpha_j + a_j * lotsize_{ij} + \beta_0 * housingcapital_{ij} + e_{ij}$. This model includes both community-specific intercept effects (the α_j) and community-specific slope effects on the value of land (the a_j), plus adjustments for a vector of housing capital characteristics.[90] If the α_j are all zero, the model is equivalent to the standard view and the notion of entry tickets to a community, which are fundamental to Hamilton's model, is rejected. If the a_j are all equal, the marginal cost of housing is the same across communities, which would be consistent with Hamilton's model with optimal zoning and only congested public goods. If neither is true—as seems most likely—there is some pricing of public goods through entry tickets and some through differential marginal costs for land and housing. A further question would be whether

88. *See, e.g.*, Epple & Sieg, *supra* note 47.

89. Nechyba, *supra* note 79, at 119.

90. Capital controls include cubics of the house square footage and age, plus interactions, a complete set of dummies for numbers of bedrooms and bathrooms, fully interacted with each other and with square footage, a dummy for the presence of a swimming pool, and a cubic in the date of sale (to control for price appreciation over the time window).

congested public goods are more likely to be capitalized in the intercepts (α_j) and uncongested amenities into the slopes (a_j).

I estimate Equation (3) using 73,324 actual housing transactions in the Los Angeles MSA from 1999 to 2001.[91] As definitions of the j communities, I use 170 high school attendance zones. Figure 5A shows one illustrative case, for Beverly Hills. The vertical axis shows the net value of land, i.e. $Price_{ij}$ -β_0*$housingcapital_{ij}$, and the horizontal axis shows lot size. The figure plots individual data points and two functional forms fit to the data. The steep line going through the origin restricts $\alpha_j = 0$. It rules out any "ticket" prices to enter the community. The flatter line shows the tilting when we allow intercepts as well as slopes. Clearly, there is a large intercept effect here. Figure 5B shows the same relationships for a much poorer neighborhood in the Watts community of south Los Angeles. Although there are still intercept effects here, as one might expect they are much smaller than for Beverly Hills: the price of admission into this community is simply much lower.

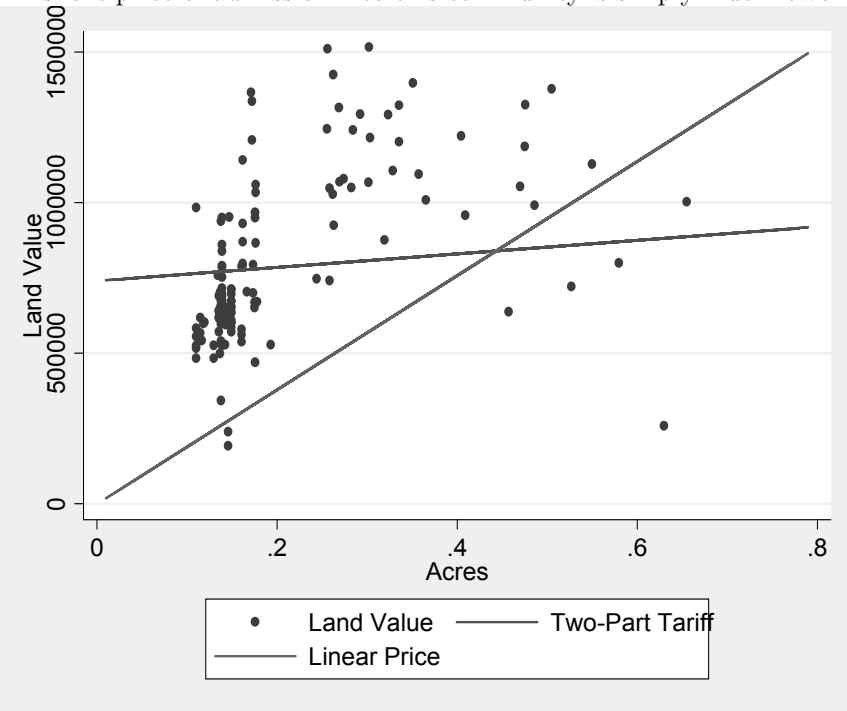

Figure 5A: Estimated Intercept and Slope for Beverly Hills

91. For a summary of these data, see Banzhaf and Farooque, *supra* note 85.

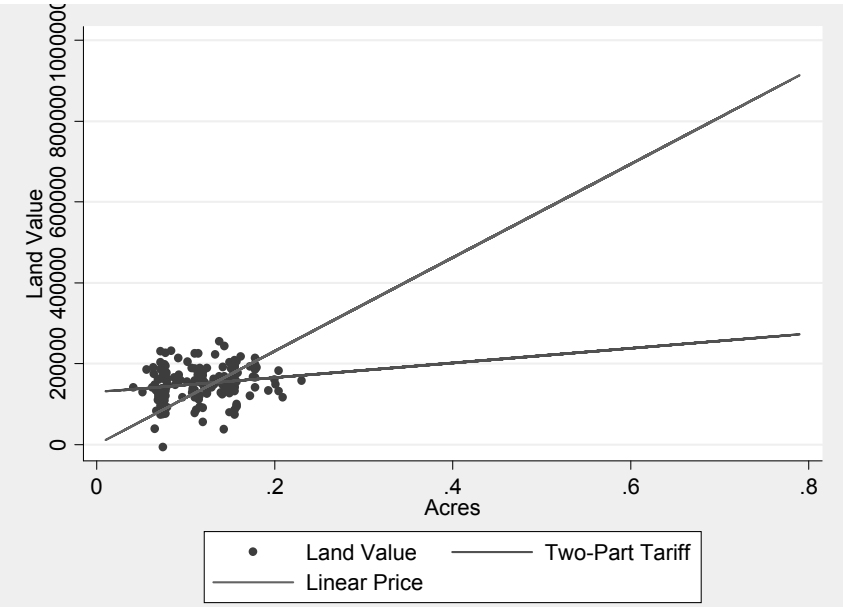

Figure 5B: Estimated Intercept and Slope for Watts

Overall, the model rejects the hypothesis that the $\alpha_j = 0$ and can be omitted from the model at the one-percent level of statistical significance. Likewise, it rejects the hypothesis that the $a_j = 0$ and can be omitted from the model at the one-percent level. Thus, there appear

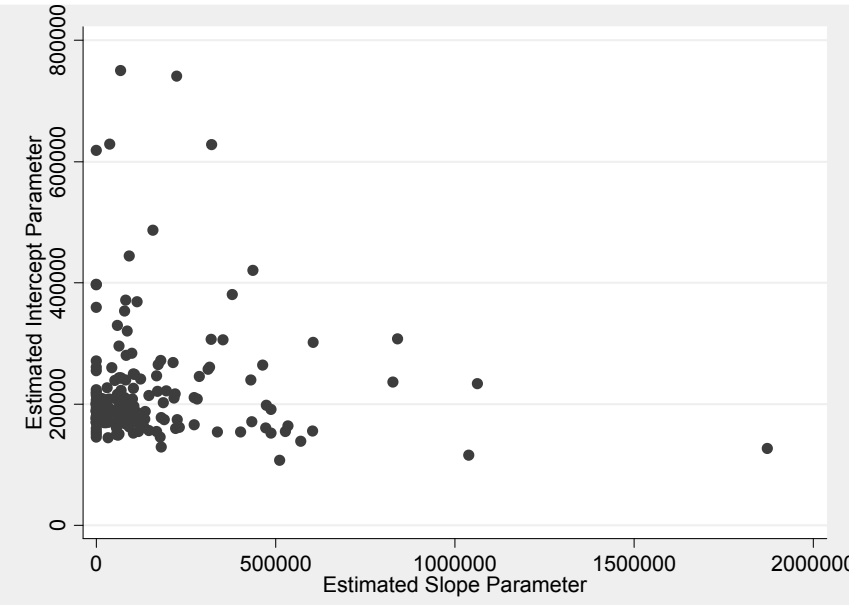

Figure 6: Estimated Intercept and Slope Effects, by Community

to be both intercept and slope effects, as one would expect if there is a mix of congested and uncongested public goods. Figure 6 summarizes the results of the model, by plotting the estimated intercepts against the estimated slopes for all 170 LA communities. The figure shows a large number of communities with intercept effects and small slope effects, bunched to the left of the figure. A few communities, to the lower right of the figure, show the opposite. Overall, there is little pattern in the two effects, with a correlation of -0.04.

Of course, one might argue that even the model allowing for intercept and slope effects is too restricted, in that it requires all effects to be linear. One might argue instead that there are no intercept effects per se, but just non-linear effects in lot size. Figure 7 illustrates the argument. It shows, for one illustrative community, the models with linear slope effects, with an intercept and linear slope effects, and two common non-linear models, the translog and the Box-Cox. These non-linear models have a very steep slope at first, effectively eliminating the need for the intercept. However, for most of the range of the data, they are practically indistinguishable from the model with intercept effects.

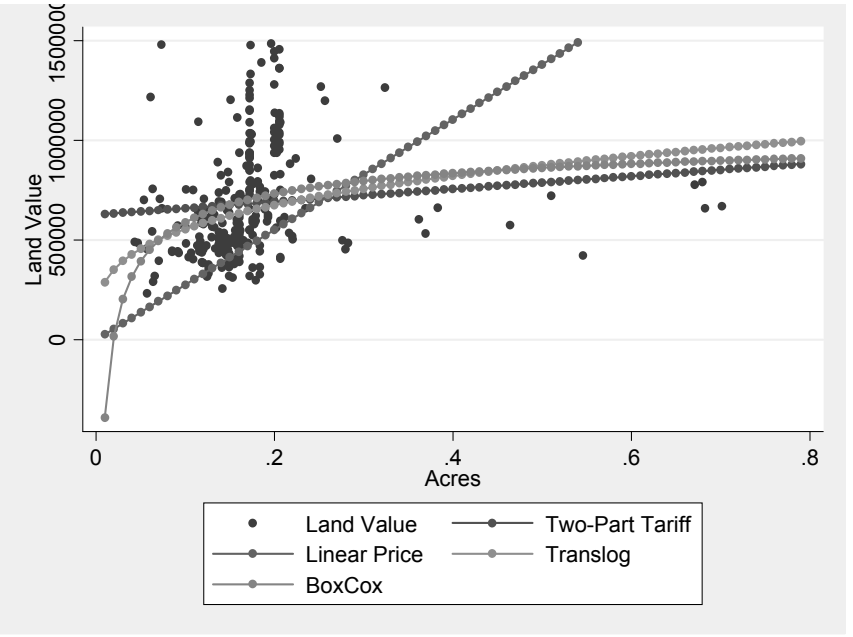

Figure 7: Non-linear Functional Forms

For this reason, I view the non-linearity argument as a semantic, rather than substantive, point. At the end of the day, in either case prices (per unit) are decreasing. Moreover, the main difference among the models arises only at very small lots where there is no data. In some ways, this only serves to underscore Hamilton's message: when zoning prohibits the consumption of small lots (or small housing bundles), we

get something very much like an entry ticket to the community or, as discussed above, a two-part tariff. Whether we extrapolate over the range where there is no data using a straight line or a steep curve is really academic.

Conclusion

Zoning poses a property rights dilemma. On the one hand, it is a restriction on the rights of individual landowners. On the other hand, it empowers local communities to close the commons against excessive entry and so-called jurisdictional choice externalities. For example, minimum lots sizes or height restrictions effectively place a cap on the number of dwelling units that can be built in a community. When local public goods are congested, or rivalrous, such restrictions are essential to prevent overcrowding.

In equilibrium, zoning has the effect of pricing access to a community with a two-part tariff. First, there is an entry ticket, a lump sum payment regardless of the lot size purchased. Second, there is a price per unit of land. The first price is essential for pricing the scarcity of the congested public good. The second price is essential for pricing the scarcity of land itself, a price that may vary depending on uncongested public goods as well as land quality. In this paper, I provide empirical evidence that land is priced in just this way. This evidence suggests that a market in local public goods is alive and well, along with the efficiency benefits markets can provide. If so, it provides a powerful argument for why public goods should be provided at a local level whenever possible. For in that case, the allocative efficiency of markets as well as the market incentives for efficient "production" of public goods overcomes the standard problems in the provision of public goods.