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The Holdout Problem and Urban Sprawl
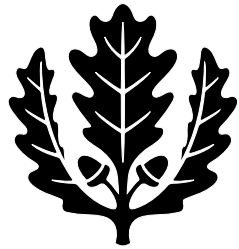
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Abstract

Developers attempting land assembly often face a potential holdout problem that raises the cost of development. To minimize this extra cost, developers will prefer land whose ownership is less dispersed. This creates a bias toward development at the urban fringe where average lot sizes are larger, resulting in urban sprawl. This paper examines the link between the holdout problem and urban sprawl and discusses possible remedies.

The Holdout Problem and Urban Sprawl

1. Introduction

Urban sprawl is a term that has been used to describe a wide variety of undesirable aspects of urban growth, including excessively large cities, overly long commutes and traffic congestion, loss of open space, and failure to redevelop decayed inner city properties (Brueckner, 2000). Proper policy responses to these problems, however, require a clear understanding of the underlying causes of sprawl. Unfortunately, there does not exist a consensus on this issue. The purpose of this paper is to point out a particular form of land market failure—the holdout problem—that may contribute to sprawl by creating an outward bias in the development process.

Like sprawl, the holdout problem has been defined in many ways. Properly understood, it is a form of monopoly power that potentially arises in the course of land assembly. Once assembly begins, individual owners, knowing their land is essential to the completion of the project, can hold out for prices in excess of their opportunity costs. The result is that large-scale projects requiring assembly, like housing developments or shopping centers, will tend to be underproduced.[1] More importantly, developers of such projects will have an incentive to seek land where ownership is less dispersed in order to minimize the need for assembly in the first place. As suggested above, this will create a bias toward the urban fringe where average lot sizes are larger, resulting in excessive outward development, or urban sprawl. To our knowledge, this is the first paper to draw the link between the holdout problem and urban sprawl.

The remainder of the paper is organized as follows. Section 2 briefly surveys the economic literature on urban sprawl as a basis for our analysis. Section 3 defines the holdout problem in the context of land assembly. Section 4 develops a simple model of land assembly to show that the cost of holdouts generally increases as ownership becomes more dispersed. Section 5 uses well-known results from the monocentric model of cities to derive the spatial implications of the holdout problem—specifically, that developers will prefer land further from the city center where lot sizes are larger and ownership is less dispersed. Finally, Section 6 discusses possible remedies for sprawl in light of the analysis.

2. The Economic Literature on Urban Sprawl

The economics and planning literatures have not arrived at a generally accepted definition of urban sprawl. After reviewing previous efforts to define the phenomenon, Galster, et al. (2001, p. 685) proposed the following, multi-dimensional definition:

> Sprawl (n.) is a pattern of land use in [an urban area] that exhibits low levels of some combination of eight distinct dimensions: density, continuity, concentration, clustering, centrality, nuclearity, mixed uses, and proximity.

While possibly useful for empirical purposes, this definition does little to advance our understanding of the underlying causes of sprawl.

Most urban economists would agree that sprawl describes some undesirable aspects of urban growth. However, they would quickly add that the spatial growth of cities, reflecting a transformation of rural or agricultural land to urban uses, is not in itself

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[1]When the government undertakes projects requiring assembly, like highways and airports, it can use the power of eminent domain to overcome holdouts (Posner, 2003, p. 55). In some cases, this power is also extended to private developers (see the discussion in Section 6).

a bad thing.[2] If, in an efficiently operating land market, land developers outbid

agricultural users for their land, this implies that the land is more valuable in urban use

and the conversion is therefore efficient. Expanding cities will thus tend to be a natural

consequence of an efficiently growing economy (reflecting, for example, an increasing

relative demand for manufactured goods over agricultural goods as income grows),[3]

reinforced by technological improvements that lower the cost of commuting.

Since some growth in cities is efficient, we will follow Brueckner (2000, p. 163)

and define urban sprawl to be the "excessive spatial growth of cities," implying

inefficient outward growth. Brueckner cites three possible sources of market failure that

in combination lead to excessive growth. First, the price of agricultural land does not

fully reflect its social value as open space, thus causing excessive conversion of

agricultural land to urban uses. Second, commuters ignore the costs of congestion when

making their commuting decisions (the congestion externality), resulting in an excessive

amount of commuting and an inefficiently large commuting range. Finally, real estate

developers do not take into account the full social cost of the required infrastructure, thus

artificially lowering development costs. The following sections advance a fourth source

of market failure, the holdout problem, as a possible contributor to the inefficient spatial

growth of cities.

3. Land Assembly and the Holdout Problem

Large scale developments often require the assembly of land whose ownership is

dispersed. Examples include public projects like highways and parks as well as private

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[2] Turnbull (2005) surveys the economic literature on urban growth.

projects like shopping centers and residential developments. A potential impediment to all such projects is the holdout problem, which arises when individual owners, realizing that they can impose substantial costs on the developer, seek prices well in excess of their true reservation prices. The holdout problem is therefore a form of monopoly power (Posner, 2003, p. 55), though it has also been characterized in terms of transaction costs (Cooter 2000, p. 289) and rent seeking (Goldberg, 1985). In any case, it represents a form of market failure in the urban land market.

It is important to emphasize that a true holdout problem requires assembly. Thus, for example, the negotiations between a buyer and seller for a single parcel, no matter how difficult, do not constitute a holdout problem in the above sense because the seller's unwillingness to sell does not affect any other transactions; it simply reflects his efforts to obtain the highest possible price. In contrast, when assembly of multiple parcels is necessary, recalcitrance of any single seller spills over to the negotiations with all other sellers by raising the cost of the entire project. The key difference is the existence of complementarities among properties in the assembly case that are not present in the individual transaction.

An important implication of the holdout problem is that the transaction costs of assembly will exceed those of disassembly, creating a one-way bias in the land market toward excessive fragmentation (Parisi, 2002; Heller, 1999).[4] Further, the spatial variation in the fragmentation of ownership in urban areas suggests a causal relationship

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[3] This shift is a consequence of the relatively high income elasticity of demand for manufactured goods compared to food (Mills and Hamilton, 1994, pp. 434-437).
[4]Parisi (2002) likens this bias toward fragmentation to the Second Law of Thermodynamics in physics, which says that in a closed physical system, the extent of disorder (entropy) will increase over time. It is also related to the "anti-commons problem," which describes a situation in which multiple owners each have the right to block a certain use of their collectively owned property (Heller, 1999).

between the holdout problem and urban sprawl. Specifically, because average lot sizes decrease closer to the city center as a result of the land rent gradient, ownership becomes more fragmented, thereby increasing the severity of the holdout problem for potential land assemblers. This will tend to push development outward. The next two sections develop this argument in detail.

4. A Simple Model of the Holdout Problem

This section develops a simple model of the holdout problem to illustrate the impact of dispersed ownership on a prospective developer's costs. The next section then introduces the spatial dimension.

Consider a developer who needs to assemble n individually owned parcels to produce a project worth V dollars in aggregate. Suppose that each parcel is worth v to the current owner,[5] making the total value of the land in its current state of dispersed ownership nv. We assume that the developer also values individual parcels at v but

$$V > nv \,, \tag{1}$$

reflecting the complementarities associated with assembly. Assume that the individual owners know (1) when negotiating with the developer.

To examine the nature of the strategic incentives facing sellers, suppose that the developer has already purchased $n-1$ of the parcels and begins negotiating with the nth owner. If the final parcel is essential for completion of the overall project (as we assume), then the aggregate value to the developer of the parcels assembled so far is $(n-1)v$, meaning that he would be willing to pay up to $V - (n-1)v$ for the nth parcel. Assume that the seller is successful in obtaining this price; that is

$$P_n = V - (n{-}1)v. \tag{2}$$

It is instructive to rewrite this equation as

$$P_n = v + (V{-}nv), \tag{3}$$

showing that the last seller is able to extract a price that reflects his full opportunity cost of the parcel, v, *plus the entire surplus from the overall project*, $V{-}nv$.[6]

The problem facing the buyer, however, is potentially worse than this. Since all parcels are essential for completion of the project, each seller effectively becomes the marginal seller, and thus, each can seek a price equal to that obtained by the nth seller. If all sellers succeed in doing this, then the total cost of the project to the developer is

$$nP_n = n[V - (n{-}1)v]$$

$$= V + (n{-}1)(V{-}nv), \tag{4}$$

which clearly exceeds its value given (1). Thus, strategic bargaining by the sellers will potentially deter the developer from pursuing the project, even though it is a more efficient use of the land.

The amount of the overpayment is given by the term $(n{-}1)(V{-}nv)$ in (4), reflecting the fact that the buyer can only pay the surplus to one seller before his costs exceed the value of the project. Further, if we assume that nv is invariant with respect to n—meaning that the aggregate value of the land in a state of dispersed ownership does not depend on the number of owners, holding the amount of land fixed[7]—then the amount of overpayment in (4) is increasing linearly in n.

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[5] It is not essential that the individual parcels be of equal value to their owners.
[6] Compare this to a buyer seeking n unconnected parcels, each worth v. In that case, each seller could at most obtain a price equal to v.
[7] For example, as n increases, the size of individual parcels, and hence their value, must decrease in proportion. As a result, $V{-}nv$ is independent of n.

This simple model captures the essence of the holdout problem, but it represents an extreme version of the problem; in reality it will probably be less severe than this analysis suggests. For one thing, buyers may initially succeed in purchasing some parcels for less than the cost implied by (2) by using "dummy buyers," or because sellers will be unaware of the scope of the project. And even when sellers recognize their monopoly power, they will still have an interest in eventually selling to the developer, for otherwise they will receive none of the surplus associated with assembly (Cohen, 1991, p. 354). Thus, the most likely consequence of the holdout problem will be delays and incomplete assembly (O'Flaherty, 1994; Strange, 1995).

It is nevertheless true that the holdout problem increases the cost of a given development, and the extra costs will likely rise with the number of sellers. It follows that buyers seeking to minimize their costs will prefer locations where land ownership is less dispersed, all else equal. We introduce the spatial dimension in the next section to show that this will bias large-scale development toward the urban fringe.

5. The Spatial Configuration of Lot Sizes and Urban Sprawl

It is a well-known implication of the standard monocentric city model that lot sizes decrease toward the city center. This is due to two reinforcing factors.[8] First, increasing land prices toward the city center cause housing producers to substitute capital for land. Thus, average lot sizes decrease, holding the quantity of housing fixed. This is shown in Figure 1, where the flatter cost line reflects an increase in the price of land relative to capital (i.e., a decrease in p_k/p_l) nearer to the city center, resulting in a decrease in the cost-minimizing lot size per house from l_1 to l_2. Second, increasing housing prices

toward the city center also cause the demand for housing to decrease, as reflected by the inward shift in the isoquant in Figure 1 from h_1 to h_2. This causes a further decrease in the optimal lot size from l_2 to l_3. The overall effect is therefore an unambiguous decrease in lot size from l_1 to l_3, implying greater population density nearer to the city center.

It follows that the ownership of a parcel of land of a given size is more dispersed the closer it is to the city center. As the discussion of the holdout problem suggested, this will tend to cause an increase in development costs toward the city center, beyond that already embodied in the land rent gradient. To illustrate, suppose that the contemplated development requires a parcel of land of size S.[9] The total cost of this parcel to the developer, ignoring considerations of assembly, is p_lS, which varies spatially as shown by the solid line in Figure 2. The aggregate value of the project, V, presumably also varies spatially, reflecting the distribution of consumer demand, transportation costs, etc. In a competitive land market, the optimal location choices by developers will therefore balance these benefits and costs, resulting in an equilibrium distribution of new development that is also efficient.

Now add consideration of the strategic cost associated with the holdout problem. Since we argued above that these costs will increase with greater dispersion, and that dispersion increases toward the city center, then the strategic cost associated with assembly will also increase toward the city center. This is shown by the dashed line in Figure 2, which reflects the total cost of a given development project as a function of location. The implication is that, compared to the situation without assembly, the optimal location choices of developers will be systematically biased outward, toward the urban

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[8] See generally Henderson (1985), Chapter 1.
[9] With n owners, the lot size of each owner is therefore $l=S/n$.

fringe, where land ownership is more consolidated and assembly costs are therefore

minimized. The result is a city characterized by urban sprawl.

6. Remedies

Because sprawl arises from a form of market failure, we consider several

remedies that could potentially be used to counteract the outward development bias. The

first is one that developers will pursue on their own to the extent possible—namely, to

maintain secrecy about the nature of the project for as long as possible (Cohen, 1991, p.

359). The most common means of doing this is to use dummy buyers acting on behalf of

the developer. The law of undisclosed agency actually promotes this practice by

allowing buyers to conceal the identity of their principal under certain conditions (Parisi,

2002, pp. 617-619).

A second remedy is for the government to adopt policies aimed at offsetting the

bias toward fringe development. This can be done by a combination of policies that

increase the cost of suburban development (e.g., zoning and other regulatory controls,

development taxes, and impact fees),[10] while lowering the cost of inner city

redevelopment (e.g., subsidies or tax breaks for the development of brownfields and other

distressed properties).

A final approach that deals directly with the holdout problem is for the

government to use its power of eminent domain to facilitate efficient redevelopment

through urban renewal (Parisi, 2000, p. 632). Seen in this light, urban renewal is a

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[10]See, for example, Brueckner (1997) and McFarlane (1999). But also see Turnbull (2005), who argues that
in a dynamic context, threatened regulations, however well-intentioned, can have significant distortionary
effects on land use incentives. For example, they can actually speed the pace of development as
landowners seek to pre-empt certain restrictions.

legitimate (albeit drastic) public response to a failure in the urban land market. This may

explain why it has endured for so long, despite its many shortcomings (O'Flaherty,

1994).

Not least of these shortcomings is that it raises serious constitutional questions

regarding the proper scope of the government's taking power. In particular, should a

private party ever be allowed to use (or benefit from) eminent domain when confronting a

holdout problem? The controlling legal standard is the Fifth Amendment Takings

Clause, which limits the government's power to take private property to projects

involving so-called "public uses."[11] Historically, courts have interpreted this to permit

certain private uses of eminent domain as a way of promoting economic development.[12]

As noted, one such use has been to allow cities, acting on behalf of private developers, to

take land for urban renewal. Perhaps the most famous example is *Poletown*

Neighborhood Council v. Detroit,[13] in which the Michigan Supreme Court allowed the

city of Detroit to condemn an entire neighborhood in order to provide land to General

Motors for construction of a new plant. The court argued that the creation of jobs and

enhanced tax base satisfied the public use requirement. As a legal matter, however, the

question is far from resolved.[14]

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[11] The relevant clause reads "nor shall private property be taken for public use without just compensation."
See Merrill (1986) and Fischel (1995, pp. 71-75).
[12] For example, private railroad builders in the nineteenth century were routinely granted takings power
(Fischel, 1995, p. 72).
[13] 304 N.W.2d 455, 410 Mich. 616 (1981).
[14]For example, in 2004 the Michigan Supreme Court overruled the *Poletown* decision in *Wayne v.
Hathcock*, 471 Mich. 445, 684 N.W.2d 765 (2004), arguing that economic development as a by-product of
a private enterprise's pursuit of profit did not satisfy the public use requirement. At the same time, the
Supreme Court of Connecticut recently allowed the private use of eminent domain for urban redevelopment
when it upheld the City of New London's condemnation of a neighborhood in order to make way for
construction of a pharmaceutical plant. See *Kelo v. City of New London*, 268 Conn. 1, 843 A.2d 500
(2004). The U.S. Supreme Court has agreed to hear this case on appeal (2004 U.S. LEXIS 5008, 2004).

A better argument would simply have been for the court to recognize that the primary economic justification for the takings power is to overcome holdouts, and that private developers engaged in land assembly are no less susceptible to this problem than is the government. In this context, limited private use of takings power seems justified, perhaps as a last resort, as a means of promoting economic development, and, in the process, of combating urban sprawl.

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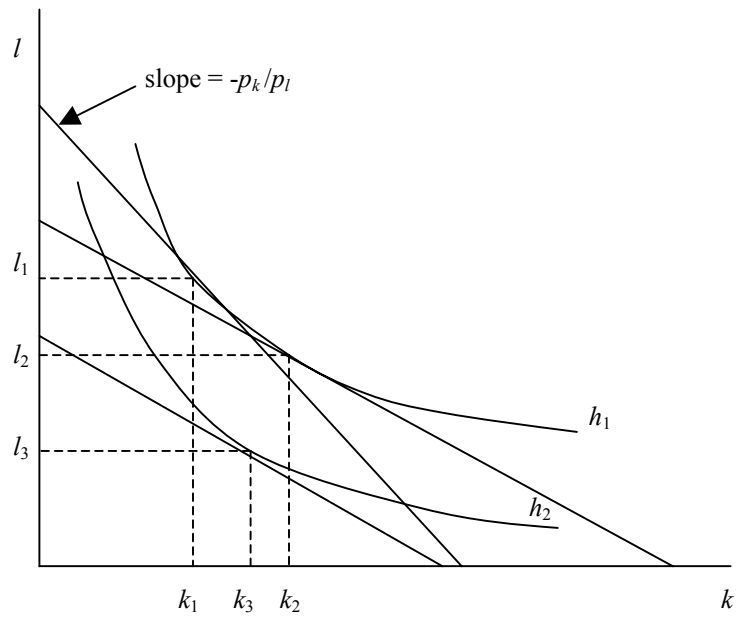
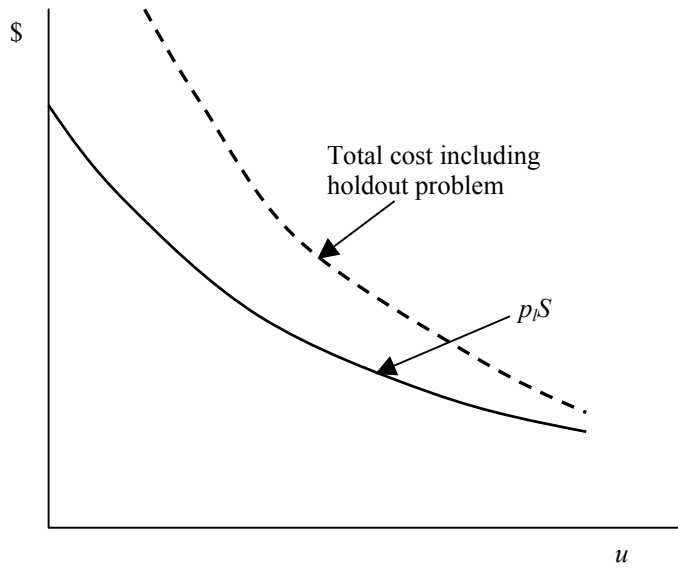**Figure 1.** Decrease in the cost-minimizing lot size closer to the city center.

Figure 2. Total development costs as a function of the distance from the city center (u).