

A mechanism for assembling properties with diverse ownership: application to the anti-commons problem

Perry Shapiro, Jonathan Pincus and Zachary Grossman *

Abstract

Assembling individual pieces of land into large parcels for public purposes often involves the use of eminent domain, including when the assembled land is passed into private hands. Questions of equity and efficiency arise. Firstly, the US and other Constitutions require that owners of compulsorily-acquired property receive ‘just’ compensation. As existing owners are likely to value their property higher than the market, a premium is justified: but how much? Secondly, the efficiency of a forced change in land-use of the assembly cannot be judged by the usual market tests. The efficiency question is more complicated when the conversion and new use of the land generates significant local spillovers. We propose a mechanism—the ‘Strong Pareto’ or SP auction—which ensures that affected landowners are fairly compensated and, simultaneously, that only efficient projects are undertaken. Crucially, the auction design elicits truthful revelation of individual property owners’ reservation prices. Comparison is made with ‘Groves mechanisms’. The SP auction could be used in ‘public-private partnerships’ for urban renewal, toll roads, ports and port-side facilities, in which eminent domain is used, and the private partner is responsible for building, owning and operating, and is motivated by profit.

JEL codes: H23, K11, D44, D71

Keywords: Eminent domain, auction, revelation theorem, compensation, externalities, anti-commons, public-private partnerships, infrastructure

* Respectively, Professor of Economics, University of California, Santa Barbara, Adjunct Professor of Economics, The University of Adelaide and Adjunct Professor of Economics, Curtin University (corresponding author) <pxshap@econ.ucsb.edu>; Visiting Professor of Economics, The University of Adelaide and Senior Adviser, Concept Economics <jonathan.pincus@adelaide.edu.au>; Assistant Professor of Economics, University of California, Santa Barbara. The opinions expressed are the authors’, and not necessarily those of the institutions with which we are affiliated.

1 Introduction

In the 1980s, the city of Detroit used its power of eminent domain to assemble a large plot of land, and compensated the displaced property-owners at ‘fair market prices’. The city then resold the land cheaply to General Motors, as site for an auto assembly plant. Subsequently, New London, Connecticut, forced a land assemblage, which was leased at very favorable terms for the private development of condominiums and luxury hotels.¹

Two connected failings can bedevil these kinds of public-sector intervention. Firstly, the US and other Constitutions require that owners of compulsorily-acquired property receive ‘just’ compensation. As existing owners are likely to value their property higher than the market, a premium is justified: but how much? Second, the efficiency of a forced change in land-use of the assembly cannot be judged by the usual market tests. And the conversion of land to a new use may generate significant local spillovers, with implications for both equity and efficiency, as well as for the political economy of planning approvals.

Recent papers by Lehavi and Licht (2007) and Heller and Hill (2007) propose an auction of the property assembled through eminent domain for transfer to the private sector. Building on their work, we specify an auction mechanism—the ‘Strong Pareto’ or “SP auction”—which deals with the above failings, by ensuring that affected landowners are fairly compensated and, simultaneously, that only efficient projects are undertaken. The mechanism would be useful only when the auction elicits competitive bidding from private sector players seeking ownership and control of the assembled parcel of land and the concomitant planning permissions. The SP auction could be used in ‘public-private partnerships’ for urban renewal, toll roads, ports and port-side facilities, in which the public sector uses its powers of eminent domain and planning approval, and the private sector is responsible for building, owning and operating facilities and structures on the assembled land, for profit.

The proposed mechanism requires a single auction of all the relevant properties taken as a whole, with each individual owner nominating the minimum price required for his or her own property.

¹ Heller and Hill (2007) and Lehavi and Licht (2007) give the factual background to the events in Poletown, Detroit, and New London.

Property owners within the zone being compulsorily acquired, as well as property owners within a declared zone surrounding the compulsorily-acquired area, would be required to participate in the auction. If a sale is made, then the compulsory acquisition is approved, as are the broad outlines of the proposed re-development. Any auction proceeds are distributed to the various former owners, according to fixed and exhaustive shares. The auction is to have a secret reserve, such that the aggregated property will sell only if the winning bid is at least sufficient to pay the reservation prices that the owners place on their individual properties. Finally, the share mechanism ensures that all owners receive at least their nominated reservation prices, if a sale occurs.

The bidding, reserve and share arrangements are such that sale at the SP auction means that the use of eminent domain passes the strict Pareto test. As with Vickery auctions and Clark-Groves-Ledyard mechanisms, the SP auction set-up elicits truthful revelations as the dominant strategy: here, revelation of property-owners' true reservation prices. The size of any non-zero pay-off to a property-owner is independent of the reservation price that he or she nominated.

Also, sale at the auction is a sufficient condition for passing the weak efficiency test. That is, the SP auction tests of the proposition that compulsory acquisition and re-development generates more benefits than costs, including local externalities. It does not, however, provide a necessary condition—the mechanism may sometimes reject what would have been an efficient change in land use. Nonetheless, it may be the best that is feasible, given the requirement for just compensation.²

In addition to providing an economic answer to a legal puzzle—what is 'just compensation' for property taken and transferred to a private owner—ours is a contribution to the literature on internalizing externalities. The attractive characteristics of fairness and efficiency may increase the political acceptability of the use of eminent domain for those public purposes that are to be carried out by profit-seeking firms.³

² In that context, it should be noted that ours is not an exercise in 'institutional design', if that exercise entails maximizing a utilitarian welfare function.

³ Somin (2004, 1007-08) argues that a 'categorical ban on economic development takings is the best solution to the problems *Poletown* and other similar decisions created.' The main problem identified are 'flaws of economic

In Section 2, we discuss why the private sector may not be able to achieve an efficient re-development of fragmented urban properties. In Section 3, we outline the proposed mechanism in more detail, and prove that the dominant financial strategy is truthful nomination of minimum reservation prices for the individual properties; and that the auction provides a test of efficiency. Comparisons with Vickery (1961) and Groves (1973) are made. For ease of exposition, in Sections 2 and 3 we focus on the use of eminent domain in urban renewal, and leave to Section 4 our consideration of local spillovers. Some limitations are outlined in Section 5, including what prevents its adaptation to purely private re-developments.

2 Private and public roles in re-development

The present configuration and ownership of land parcels are the results of historical processes, beginning with the official surveys and subdivisions. Over time, the original division and uses of land may have become very inefficient.⁴ Minutely subdivided low-rise commercial properties may later be more efficiently deployed in larger and more extensive commercial or mixed developments. Properties with single-family residences in the inner suburbs may now be better dedicated to a higher-density use that requires more land than any one lot provides. Moreover, substantial areas of cities may have so deteriorated that large-scale re-development is desirable. And, on a larger scale, existing land allocations for various forms of infrastructure—airports, transport corridors, or portside—may prove inadequate.

Land re-development has two stages, the first being land and land use—mainly planning, assembly of land, and approval; the second concerns what takes place on the land, including preparatory work, building of structures and conducting activities that utilise the structures and the land attached to them. In this paper, we assume that the private sector is charged with the second stage, and so we are concerned only with the first stage, in which prospective private developers discover and plan for a new use of land; identify and assemble a suitable parcel from

development takings more generally. Such condemnations allow politically powerful interest groups to “capture” the condemnation process for the purpose of enriching themselves at the expense of the poor and politically weak.’

⁴ Michelman (1967) labels this ‘the tragedy of the anti-common’. See also Buchanan and Yoon (2000), Heller (1998), and Parisi and Depoorter (2006).

fragments; and apply for approvals to undertake the necessary work and for conducting the new economic activity. Although the private market mostly copes effectively with these elements, government sometimes supplements or supersedes it, acting not only as development planner in its own right, but also as assembler, using the power of eminent domain. Government then often short-circuits of the usual processes for the determination of applications for the re-development of the assembled parcel; and may assist the re-development in other ways.⁵ Having exercised eminent domain, governments may still involve the private sector in building, owning and operating the new or extended facilities for profit.

It is convenient to discuss planning approvals first. Especially for major re-developments, the usual public process for determining private applications for re-development may not allow the private sector to achieve efficient land re-development. Many cities have had experienced vigorous opposition to private planning proposals, especially for large, new or extended, shopping centers or high-rise buildings.⁶ Consideration of a development proposal can take years. This may or may not be a good thing, but it can add greatly to the cost and uncertainty of development planning. Opposition may arise on various grounds, but generally involved are local spillovers that arise during the demolition and construction phases, or through the operation and use of the new structures.

In planning, the private developer is naturally enough concerned with profit. Externalities—except as they may figure in the development approval process—will not weigh in the developer’s calculus as heavily as will any internalized costs and benefits. Although the current approvals process gives some consideration to the externalities imposed or conferred on other property owners (or their tenants), it is not clear how these processes measure and balance the interests of proponents and opponents.⁷ Moreover, the existing arrangements are not necessarily

⁵ See Fischel (2004) on the effect of grants on the use of eminent domain.

⁶ For example, Geoffrey Rush, the Australian actor who lived near the train station at Camberwell Junction in the Melbourne city of Boroondara, successfully led public protests against the private development of the airspace above the station, in the form of a three-storey building of shops and residences. Around Melbourne, people still recall vividly the fight, more than forty years ago, to prevent the building of a very large shopping Centre at Chadstone on a site (which was assembled through private treaty and not the use of eminent domain). Incidentally, Madison Square Garden, an entertainment venue, was built in the late 1960s on air rights atop Penn Stations in Manhattan.

⁷ In its discussion of planning approvals mechanisms, the Productivity Commission (2004) concentrated on questions of processes, and not the objectives of the mechanisms.

definitive, for there is a wider, political process through which pressure can be brought to bear on government.⁸

In land assembly, with many different existing land-owners, private negotiations can be so costly that private developers or brokers can be dissuaded from proceeding; and, due to the ‘hold-out’ problem, the additional cost can have adverse consequences for economic efficiency.⁹ Private assembly is profitable if the value of the assembly exceeds what it costs to extinguish all legal claims to ownership and use of the land and structure thereon. Assembly requires the identification of those with such claims, followed by successful negotiation of separate agreements with them. This cannot be done all at once, but necessarily involves a period of time and a sequence of actions, including signing of many contracts of sale. Despite efforts at secrecy, it is hard to keep from other parties the fact that someone is engaged in assembly (or actively investigating it). Each existing owner of claims would prefer to obtain as much as possible of the surplus between the value of the assembly and the costs of assembly. In this, delay in agreeing to sell may increase a land-owner’s bargaining power: it can be useful to ‘hold out’ until your agreement is one of the last necessary for the assembly to be completed.¹⁰

If the transformation of property use is judged sufficiently important to the community, government may invoke the power of eminent domain. Commonly, when there is an exercise of eminent domain, the usual processes for assessing development plans are set aside or short-circuited: government, with a wider public purpose in view—like re-invigorating an area through the attraction of private employers; or improving transport flows—may also have cause to act as planner. This is most likely the case for major infrastructure projects, like for a toll-road or a port. Once planning has been done, public authorities condemn property and force sale at a ‘just’

⁸ In reaction to these considerations, governments have assisted some private re-developments, by declaring them to be ‘major’ or ‘state developments’, thus giving the relevant State or Federal Minister some or all of the planning powers normally exercised by local government or statutory planning authorities.

⁹ On private ‘takings’ and hold-outs: Nosal (2007), Hellman (2004), and Alpern and Durst (1997). For an interpretation of the hold-out problem as a Prisoners’ Dilemma game, see Miceli and Segerson (2007).

¹⁰ It has been claimed that the first acre acquired for Disney World cost \$80, and the last cost \$80,000 (Mongello 2005).

price. The assembled plot may then be offered, often at favorable terms, to private developers for a use deemed to be in the public interest.¹¹

We offer an alternative way of transferring the assembly to the private sector. An attraction of our proposed auction mechanism is that, if a winning auction bid is made, then the strong Pareto test is satisfied: no owner of a compulsorily-acquired property is under-compensated. Moreover, the SP auction mechanism can ensure that the new land-use is more valuable than the old, including when account is taken of local spill-overs.

3 The SP auction with eminent domain

To recap the background: in pursuit of a public purpose, government has identified a number of properties, with various private owners, as being suitable for assembly into one parcel for re-development and use by the private sector. Assembly is to be undertaken through eminent domain. The economic questions are first, is the proposed new use of the land more valuable than the existing uses; second, what is just compensation? We will first focus only on the properties over which the use of eminent domain is proposed, leaving considerations of local spillovers to Section 4. In arriving at our formal results, we use the following definitions and symbols.

¹¹ The US Supreme Court accepted this reliance on private actors to carry out public purposes, but only if the public sector had conducted adequate planning and otherwise had an adequate justification: Merrill (1986) and Dreher and Echeverria (2006).

TABLE OF SYMBOLS

PD: Potential Displaced – landowners who must surrender their property if the auction is successful

PA: Potential Acquirer – developers with interest in bidding on assembled parcel

α_i : PD_i's share of the final auction price

R_i^* : PD_i's true reservation price for own property

R_i : PD_i's announced reservation price for own property

r_i : The auction reserve implied by PD_i's announced reservation price, R_i

r : The actual auction reserve

B_j : PA_j's bid

B_j^* : PA_j's maximum willingness to pay

B^* : The winning bid

EV_i: PD_i's expected value

$f_i(\cdot)$: The subjective density function representing PD_i's belief about the distribution of bids

\bar{B}_i : Upper limit of support for $g_j(\cdot)$

$g_j(\cdot)$: PA_j's subjective distribution over possible auction reserves

On one side of land assemblage are those who must give up claims to rights within the assembled area. These are the potentially dislocated (PD). On the other side, there are the potential auction-bidders, interested in purchasing the assembled land as a single parcel: we call these the potential acquirers (PA). The single parcel is offered at a first-price auction, with rules slightly modified from the common ones. Bidders will make successively higher open or oral offers until all bidders, but one, refuse to place an offer higher than the last. The one remaining bidder is allowed to make one, and only one, more bid. If the final offer is at least as large as the auction reserve, the final bidder takes ownership of the assemblage. If the final bid is smaller than the reserve, the land remains with the original owners. With this design, the PAs determine their bidding strategy, discussed later.

Each PD is guaranteed a share (α_i) of the assembled property's sale price if there is a successful highest bidder.¹² The significance of the shares is discussed later: here, it is important to note that they are fixed and outside the influence of the landowners. Every PD is required to participate; and is required to nominate a reservation price, R_i , at which he or she would voluntarily sell his or her property. The implied auction reserve preferred by person i , denoted r_i , is equal to R_i/α_i : if the winning bid equals R_i/α_i , then PD_i can be paid his or her announced reservation price. The actual auction reserve, r , is the largest of these r_i . **This reserve price is never revealed to bidders or landowners.** If an individual's announced valuation of their own property is truthfully the minimum, then we label it R^*_i .

The details of the auction are important, because they ensure that landowners and bidders are knowledgeable on some matters and ignorant of other, which in turn ensure the effectiveness of the SP mechanism. Specifically, bidders and landowners must not know the auction reserve; and landowners must believe that the distribution of potential bids is independent of the value of the auction reserve. It is not necessary that the bids are truly independent of the reserve, but only that the landowners believe that they are. In what follows, we provide sufficient conditions for

¹² Montero (2008) proposes an auction system with shared proceeds, where the shares are set so as to solve optimally a revelation problem of the commons, not the anti-commons. The shares in the SP auction are exogenous.

independence. But first, we consider the motivation and decision of the bidders (PAs) and the landowners (PDs).

Bidder's choices

We impose few restrictions on the rationality of the Potential Acquirers, in arriving at their bids, which we label B_j . The PAs anticipate considerable outflows of money before any income is realized, and seek at least a normal return, risk adjusted.¹³ For any re-development, the assembled tract of land must be cleared; infrastructure installed; structures erected; tenants found; investors wooed and loan commitments solicited; detailed designs devised; planning board meetings attended; and so on. For infrastructure, a similar sequence is required. In addition, eminent domain is being used for the pursuit of public purposes, so the PA needs to keep in mind whatever attendant special conditions that government has imposed. The PA will calculate the net present value of the cost and income streams, incorporating the risk assessment and the required entrepreneurial return. This NPV determines the maximum the PA would be willing to bid, B_j^* : if the assemblage can be acquired at this value, the PA anticipates an acceptable profit.

As the auction unfolds every PA_j would be willing to offer increasingly larger bids as long as their offer is no bigger than B_j^* . If the last bid is bigger than that number, the PA will drop out of the competition. The auction will continue until one PA, say J, offers a price, B_J , that is higher than all other bidders' upper limits. J is then the only surviving bidder and is offered the chance to make one higher bid. If J is sufficiently confident that his existing offer is larger than the auction reserve, he will offer no more. Otherwise, he will make one further bid, no greater than B_j^* . He will then find out if his bid is successful, but not the exact value of the reserve, which remains a secret.

There are many ways that J can choose the ultimate bid—here we suggest a reasonable PA decision calculus. Although it may be too formal to describe the thinking of actual bidders,

¹³ With the simple narrative about PA's choices, we want to emphasize the contribution made by developers to the redevelopment process. It is an aspect of urban renewal that is often overlooked. The developers apply their considerable skills toward an uncertain end. We omit discussion of financing, as not being the subject of this paper.

nonetheless it highlights what must be true if the auction reserve is truly secret, which is that the bidders' choices cannot depend on the 'true' reserve.

We assume that PA_J chooses a final bid to maximize the expected value of the transaction. If his bid is not successful he will get zero, and if successful he will enjoy the surplus of his maximum possible bid B_J^* over his final bid. We assume that the last surviving bidder has a notional distribution over possible auction reserves, $g_j(r)$ – for expositional ease, we assume that this (subjective) density function is continuous and differentiable.¹⁴ The expected value depends on the bid:

$$V_J(B_J) = [B_J^* - B_J] \Pr(r \leq B_J) = [B_J^* - B_J] \int_0^{B_J} g_j(r) dr$$

The expected-value-maximizing bid is found as the solution to

$$\frac{\partial V_J}{\partial B} = -G_J(B) + [B_J^* - B]g_j(B) = 0 .$$

Here $g_j(\)$ and $G_J(\)$ are the density and cumulative density functions respectively. If $G_J(B_J) = 1$, bidder J is sure that the existing offer is at least as large as the reserve, and the bid will remain unchanged. However, if $G_J(B_J) < 1$, the final offer will increase, but never exceed B_J^* . It is important to note about this, and about any other feasible solution to J's problem of choice, that **the final bid decision is independent of the true auction reserve.**

Landowner's choices

The potentially displaced landowners, the PDs, are asked to reveal the personal value of their real property holdings. The current subjective value of a particular property is specific to the PD with an interest in the property and is known to that person alone—it is not common knowledge. It is reasonable to assume that this value, R_i^* , an owner's true reservation price, exceeds the property's current market value. Otherwise, the owner would have sold already.¹⁵ From this

¹⁴ Each bidder may have a notion of what the reserve is, but that notion is only an approximation of the truth.

¹⁵ R_i^* is net of the major costs of selling an individual property—collecting information, preparing the property for sale, opening the property for inspection, agonising over bids, paying agency fees, and so on. Therefore, the owner would seek to sell the property if the market value exceeds R_i^* . Realistically, however, a PD is unlikely to know the

point of view, the efficiency of a project depends on whether or not the auction value, B^* – the highest bid – exceeds the sum of the PD true reservation prices: the project is efficient if

$$B^* \geq \sum_i R_i^* .$$

The auction reserve, r , is derived from the value signals sent by the landowner. We show now that, under a reasonable set of conditions, all PDs find it in their interest to reveal their true values. First, we lay out the required conditions and then we demonstrate that they imply that all PDs will truthfully reveal their true values. This insight, along with the bidding process, allows us to conclude that application of the SP auction leads to efficient transfers of ownership land assemblies, and to an equitable outcome in which every displaced landowner is compensated by the personal value, at worst.

Assumptions:

- 1) Every PD_{*i*} knows exactly how much money, R_i^* , is needed to be indifferent between selling their property and retaining ownership.
- 2) The auction shares allocations, α_i ($0 \leq \alpha_i \leq 1$, $\sum \alpha_i = 1$) cannot be manipulated by the PDs.
- 3) The auction reserve is the largest of the ratios of announced R_i to individual shares, i.e.

$$r = \max \{R_i / \alpha_i\}$$
- 4) The auction reserve is unknown to all PAs.
- 5) Every PD holds a notional distribution of potential bids, B_i . These distributions are characterized by individually- specific density functions, $f_i(B)$, such that $f_i(B) > 0$ for $B \in [0, \bar{B}_i]$. In the analysis that follows, it is assumed that the maximum bids are continuous random variables. However, the conclusions do not depend on continuity; indeed, some individuals may consider them as continuous and others as discrete. We emphasize that the density functions are notional and potentially idiosyncratic.
- 6) For every PD the subjective distribution of bids is independent of r .¹⁶
- 7) PDs are risk neutral, i.e., they seek to maximize the expected value when choices are risky.

current market value from moment to moment; and, furthermore, some PDs might be willing to sell if offered immediate cash equal to the current market value.

¹⁶ This independence condition is a natural consequence of assumption 4.

8) If a PD is indifferent between revealing true value and any other number, R_i^* is the announced value.

Assumption (8) is needed to account for the possibility that \bar{B}_i may be smaller than R_i^* / α_i .

In this case PD_i believes that the maximum possible bid is so small that there is no chance that the auction will yield a personal payment that is as large as the loss of personal value.

Then PD_i will be indifferent between revealing true value R_i^* and any larger number.

We will first prove the theorem formally, and then exposit it informally.

Lemma: \bar{B}_i does not depend on r .

Proof: A consequence of 4 and 6 ///

SP Revelation Theorem. *If conditions 1-8 hold, then it is a dominant strategy for all PDs to announce the true individual preferred auction reserve $r_i = R_i^* / \alpha_i$.*

Proof. Condition 7 implies that all PDs choose alternatives that maximize their personal expected value, which depends on the reserve price, r , as follows:

$$EV_i = R_i^* F_i(r) + \alpha_i \int_r^{\bar{B}_i} B \cdot f_i(B) dB \text{ where } F_i(r) \text{ is the cumulative density of } B$$

evaluated at the auction reserve, r : $F_i(r) = \int_0^r f_i(B) dB$.

Note that if r is equal to or greater than \bar{B}_i , then $F_i(r) = 1$. In this case PD_i believes that a successful auction is impossible and that i 's announced reserve does not affect the outcome. PD_i is indifferent between revealing the true reserve and any higher value. Condition 9 assures a truthful revelation.¹⁷

¹⁷ Alternatively we might have assumed that the support for all of the idiosyncratic distribution has an infinite upper bound. Thus those PD's who believe there are no PAs willing to submit a bid high enough to fully compensate them will truthfully reveal R_i^* . The remainder of the proof deals with those who believe the auction reserve is smaller than \bar{B}_i .

The expected value formula can be understood by considering the auction's potential outcomes. If there is no successful bidder, then every PD retains the personal value R_i^* , with subjective probability $F_i(r)$. With probability $1 - F_i(r)$, a PD's expectation is α_i times the winning bid, conditional on its being larger than r . EV_i , the conditional expected value, weighted by the probability of a successful bid, is $(1 - F_i(r)) \int_r^{\bar{B}_i} B \cdot \frac{f_i(B)}{1 - F_i(r)} dB$, where $\frac{f_i(B)}{1 - F_i(r)}$ is the density of B conditional on $B > r$. Given this, we now show that it is optimum for every PD to announce his or her true reserved price as the one he or she prefers for the auction.

The derivative of the landowner value with respect to r is

$$\frac{\partial EV_i}{\partial r} = (R_i^* - \alpha_i r) f_i(r).$$

The sign of this derivative depends on the difference between an individual's "true" reserve price and $\alpha_i r$. It is positive for all values of r for which $R_i^* > \alpha_i r$ and negative for $R_i^* < \alpha_i r$. The optimum auction reserve for PD_i is $r_i = R_i^* / \alpha_i$. If the rule for the auction reserve is to set $r = \max \{r_i\}$, then no matter what others announce, PD_i announces R_i^* / α_i . This is so because a reserve announcement less than the maximum of all others does not change the auction reserve¹⁸ and a reserve announcement higher than the maximum, if that is not the individual optimum, decreases PD_i 's expected value.//

Corollary: *If an SP auction results in a successful bid: 1) every PD is fully compensated or over-compensated for the property loss and 2) the transfer of ownership is efficient.*

Proof:

- 1) Any successful bid B^* must be larger than the auction reserve r . Since $r = \max \{R_i / \alpha_i\}$ and, as has been proved, $R_i = R_i^*$ for all i , then $\alpha_i B^* \geq R_i^*$ for all i .
- 2) The bid of any PA_j will be no larger than his or her maximum willingness to pay, B^*_j . Therefore for the winner, say PA_j , $B_j \geq B^*$. Therefore the winning bidder value exceeds the sum of all PD_i values, i.e. $B_j \geq \sum \alpha_i B^* \geq \sum R_i^*$.//

¹⁸ Perhaps more accurately, if $\alpha_i R_i$ is smaller than any other announcement, then PD_i is indifferent between all announcements less than the maximum; but we assume that the auctioneer maintains secrecy about the actual reserve.

Informal exposition of the theorem

Consider the financial consequences for an individual owner of providing the auction authority an untruthful high nomination of the minimum price at which he or she would be a willing seller. A defining feature of the SP auction process is that, if there is a successful bidder, each of the PDs will receive at least what they have nominated as their individual minimum price; and receive more, if the reserve exceeds the sum of those individual reservation prices. Inflating his or her announced minimum price does not increase his or her payment, if a sale of the assembled asset goes through—this is because the distributed payment to each owner is a fixed fraction of any auction proceeds. Now, it is the case that an untruthfully-high minimum compensation can raise the reserve price. However, and this is crucial, there is no financial upside, only a possible downside. Notice first that, since the reserve is secret, changing it will not change the size of the highest bid—and the highest bid, if it exceeds the reserve, is what is shared with the individual owner. However, an artificially-high nomination could raise the reserve so that it exceeds the (yet-to-be-revealed) highest bid, when otherwise it would not have. If so, then no sale takes place when, other than for the untruthfully-high nomination, a sale would have taken place. Such a lost sale would have paid the individual at least the minimum price that he or she truly regards as satisfactory.¹⁹ It is in this sense that there is no financial upside of an inflated nomination, only downside. On similar reasoning, the announcement of an untruthfully-low minimum price will not improve the expected financial value of the auction to the individual owner. That is, by ‘manipulating’ his or her announced minimum price, the individual cannot gain financially.

This illustrates the central claim. The auction induces every PD to state their preferred value for the auction reserve as equal to their own reservation price for their own property, divided by their share of the auction proceeds. Irrespective of the reserve choices of other landowners, every current resident chooses the auction reserve price that is a proportion of their own reserve price. The factor of proportionality is given (or imposed) via the shares, α_i , and, in particular, is independent of the personal investment choices and announcements of preferred auction

¹⁹ Specifically, a rise in an individual’s nominated minimum price for his or her property will increase the reserve only if that minimum price ‘determines’ the reserve (that is, if it is the nominated compensation become the numerator of the highest of all the ratios of minimum price to share); otherwise, the reserve is unchanged. If an untruthfully-high minimum price is nominated and it does increase the reserve, then it may cause no sale to occur, when a sale would otherwise have occurred; and will abort the auction if the reserve has been pushed above the (exogenous) highest bid—a rise in a secret reserve will have no effect on the size of the highest bid.

reserves. The 'revelation' proof does not depend on how these shares were determined, so long as they are fixed and exogenous. However, the shares do matter for efficiency and maybe for perception of fairness (as discussed in Section 5).

Comparison with Vickery-Groves

The SP auction follows the tradition of the Vickery (1961) auction and the Groves (1973) and Clark (1971) mechanisms, in which an irreplaceable feature is that the individual's price is independent of the self-revealed own value. Vickery auctions achieve this with the requirement that the highest bidder pays the second highest price; in Groves-Clark, the public good "price" faced by an individual depends on the marginal cost of provision and the marginal values revealed by all others. Our auction rules achieve a similar independence by making the share assignments independent of personal choices. The result is that truthful revelation of personal value is a dominant strategy.

However, although the SP mechanism does induce individuals to reveal their true values and a successful auction sale insures a social welfare-maximizing result, the SP auction is not a *Groves mechanism* (GM). GMs are applied to the provision of a single public good: the size of the public good expenditures is determined to maximize the sum of individual evaluations (maximize social welfare) as they are revealed by all citizens. The transfer (tax) to a particular individual is a function of the values stated by all other (not own) individually-revealed values. It is dominant strategy for all to reveal their true valuations, as it is with the SP auction. Green and Laffont (1977) prove that all social welfare maximizing revelation mechanisms that induce truthful value revelation are GMs. The SP mechanism is clearly not a GM; yet, truthful revelation is a dominant strategy, and all successful SP auctions are efficient.

The difference between SP and GM is that the application of SP does not guarantee a socially-efficient outcome: some welfare-improving projects may be rejected. This follows from the requirement for 'just compensation'. Efficient projects are rejected when the auction reserve exceeds the highest bid, which in turn exceeds the sum of individual values. Such projects would produce values greater than the *status quo*. However, the SP mechanism ensures that a project that does induce a successful bid is more valuable than the *status quo* and, in fact, more valuable (profitable) than any alternative project.

Shares for sale

Thus far, we have assumed that the shares are distributed in a way that cannot be influenced by PD choices. When we extend the analysis by allowing the shares to be traded, we find that trading opportunities do not change the conclusion that the SP auction induces true-value revelation, and selects only efficient transfers of ownership of the assembly. However, details of the outcomes depend on the nature of the allowed transaction.

Three possible exchanges are:

- a) Both property-ownership and shares are bundled so that when a person buys a share she gets full ownership of the property as well. The value nomination can be made by the purchaser and her share is the sum of the shares purchased.
- b) Shares and property ownership are unbundled and the only share-owners can nominate an auction reserve.
- c) Shares and property ownership are unbundled, but only property owners can nominate an auction reserve.

Before considering the implications of each of these trading rules, we specify the value that an individual, say j , places on property i (j not necessarily the same as i). This value will depend on whether or not ownership is bundled with shares. If bundled, we have:

$$a) \quad V_{ij} = F_j(r)R_{ij}^* + \alpha_i E_j(B | B > r)[1 - F_j(r)],$$

where V_{ij} is the value that j places on property i ; $F_j(r)$ is j 's assessment of the probability that the final bid price is smaller than the reserve; R_{ij}^* is j 's ownership value of property i and $E_j(B|B>r)$ is j 's expected value of a final bid contingent on a bid larger than the reserve.

If the ownership is not bundled with the shares, then:

$$b), c) \quad V_{ij} = \alpha_i E_j(B | B > r)(1 - F_j(r)).$$

If the shares can be purchased only with property ownership, as in (a), the conclusion that the owner nominates the true value, in this case R_{ij}^* , is unchanged. The final auction reserve may be different, reflecting the different ownership values. Nonetheless, a successful bid assures an

efficient transition of land uses. If, however, the shares are purchased separately from the land itself (and so are options), there is a considerable change in the outcome.

For case (b), the reserve nomination is conveyed by the share owner (who need not be the landowner). A person who owns only a share and no land has an option that is valueless if there is no successful bid. Therefore, for the share-only person, the lower the auction reserve, the better. By the reasoning of the previous section, each person with only shares will nominate an auction reserve of zero.²⁰

If the right to nominate a reservation price is retained by the land owner, there will be no market for the shares. This is the case because, if the option-seller retains ownership in the land if the auction is unsuccessful, she will nominate an auction reserve that will ensure that there is no successful bid (say $r = \infty$).

4 Compensating those outside the development area

Most infrastructure and urban re-development projects have consequences that extend beyond the boundaries of the development area itself. The value of property in proximity to the development or infrastructure may increase or decrease, due to spillovers. In this section we show that, if properties subject to spill-overs are included in the SP auction, their external costs and benefits will be internalized through common ownership.

This is what would be achieved through the private assembly of the development area, $\{DA\}$, together with ownership of the surrounding affected area, $\{AA\}$. This was achieved by the Disney Corporation: before it established Disney World in Florida, Disney secured ownership of the land required for the facility, as well as much of the surrounding land, to a total of 47 square miles (Mongello 2005). Similar are ‘company towns’ in which the owner of, say, a huge mining tenement, establishes on land that the company owns, a town for workers and those who service their needs. Land-grants for railways are based on the same idea: internalize the externalities,

²⁰ Thus, if individual $j, j \neq i$, purchases α_i , the price of the share option will be at least as great as V_{ij} and no greater than V_{ij} . In case (b), with disjoint ownership of share and property, the revelation by person j is not her value of the real property concerned, but of her preferred reserve. However, the strict Pareto criterion is satisfied, and sale in the SP auction assures an efficient transfer of ownership of the assembly.

via common ownership of the land (and facilities) that cause the spill-overs, as well as of the land subject to spill-overs.²¹

Figure 1 shows a Development Area, DA, surrounded by an Affected Area, AA. DA is one property, assembled through eminent domain, from individually-owned pieces. There is a proposal for the transformation in land-use in DA; the plans for change are confined to the Development Area. The neighbouring properties, in AA, are not subject to eminent domain, but will be affected by the proposed development, negatively or positively.²²

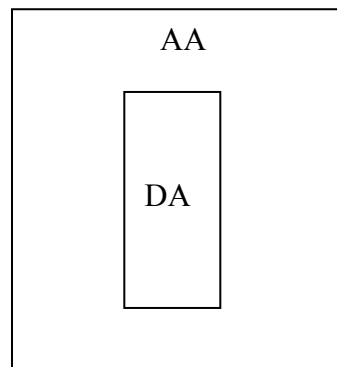


Figure 1: Development Area and Affected Area

In most instances, the building of a factory (say) where previously there were residences will affect other property owners. These are the owners in AA of Figure 1. Some may gain in amenity or market value—e.g., because of the prospect of employment in the new factory, or the convenience of a new shopping centre. Others in the AA may lose amenity, and their market values may fall—due, say, to noise pollution or congestion. These external gains and losses should also be taken into account, when judging the efficiency and equity consequences of the proposed development.

²¹ For land grants to railway entrepreneurs, see Pincus (1983). In the absence of land grants, governments have used betterment taxes and other Henry George-like schemes: Starrett (1988). The urban infrastructure of Canberra, Australia, prior to self-government, was largely financed through the development authority's capture of the increased land values that its developmental expenditures induced.

²² For convenience of exposition, we assume that the area DA is both the area of land to be used in the new development, and the extent of properties to be compulsorily-acquired. However, government may already own some land within DA, so that the area of compulsory acquisition may be less than DA (e.g., there is an existing publicly-owned transport easement, too narrow for the proposed toll road). AA and DA are disjoint.

The boundaries of DA have been decided by public processes that we take as given. As for AA: in theory, the whole world can be affected by the development of the DA; but for practical reasons, we focus on areas subject to local spillovers only. We assume that the area AA is known and fixed—the determination of its boundaries is immune to manipulation by the property owners.²³

The test for economic efficiency is whether the compulsory acquisition and re-development of DA adds value to the *combined* area, {DA + AA}. In contrast, an SP auction for DA alone tests if the new use of DA is more valuable to the new owner of DA than to the former owners.

Extending the single SP auction to include the properties in AA would internalize these external effects. It would require government to require participation in the one auction not only of the owners of property to be directly developed, but also designated properties outside the development area which will be affected by the development. If the auction leads to a sale, only then will the development plans be approved. Fixed, positive auction shares are allocated prior to the personal revelation of value; and the shares of all participant property-owners, those in DA as well as those in AA, together add to one.

As long as all the additional participants have the knowledge and the pecuniary motivation that we have postulated, then this extension would satisfy the central revelation theorem, proved above. By increasing the area, the set of those potentially affected is increased, but the calculus remains the same: it is rational for all the owners to announce their true minimum prices. Therefore, all are compensated, if the auction sale is made. In addition, bids for {DA+AA} will be greater, or less, than bids of {DA} alone, to reflect the bidder's expectation of the post-development value of AA, which itself depends on the developer's own decisions.²⁴ Thus, the extended SP auction internalizes the externalities, through common ownership of DA and AA. We now discuss both sides of the auction.

²³ The strength of our model does not allow for landowners to appoint themselves affected or not: the optimistic conclusions for the SP mechanism do not necessarily obtain if participation were freely chosen.

²⁴ The bids for {DA + AA} would be less than the bids for {DA} alone only if the value of {AA} were expected to be negative, after the re-development of {DA}: e.g., a toxic wasteland that must be remediated at huge cost.

Motivations of those in AA

The theorem applies, so that the dominant financial strategy for the owners in AA is to nominate the true minimum reservation price at which they would be willing sellers. That reservation price—for reasons spelled out earlier—should not be influenced by what the properties are worth to others but only by what the property is worth to them, subjectively. By truthful nomination, they maximize the expected value of the difference between their payout from the auction, $\alpha_i B^*$, and their true reservation price. (In section 5, we discuss non-financial motivations.)

Motivations of the PAs

The winner of the auction for {DA} gets DA; the winner of the auction for {DA+AA} gets both. Expanding the auctioned area from {DA} to {DA + AA} makes the problem more complicated for the potential developers. First, the profitability of the development itself is evaluated, as described earlier.²⁵ The next step is to decide how the development within the DA affects the property in the AA (and maybe, *vice versa*), and how that changes decisions about prospective spending on DA and, therefore, the bids.

The PAs would be willing to pay more for the entire AA and DA area together than for the DA by itself, so long as the post-development value of AA is positive.²⁶ The additional willingness to pay for {DA+AA} over {DA} is bounded from above by the bidder's estimate of the *post-development* value of {AA} itself. If the re-development of DA causes a large expected increase in the value of AA, then the increase in the maximum bids, B_j^* , will be large; if the re-development is damaging to values in AA, then the rise in the B_j^* will be small.

Most importantly, common ownership means that any bidder will assess the advantages of (future) marginal expenditure in DA by the effects on the value of AA as well as the effects on

²⁵ That is, estimate the distribution of the potential cost and revenue streams generated directly from the project and then compute what land price is necessary to meet whatever is the desired expected return. In this calculation, the larger is the perceived riskiness, the larger the expected return required

²⁶ The PA may have attempted to gain some advantages by making secret purchases of properties in the area AA; or made purchases designed to reduce opposition to the proposed development. The sponsoring public agency might change the acceptable uses of the AA property (e.g., rezone) to allow uses that are more complementary with the DA uses. The new zoning can lead to capital gains in the AA.

DA. The spillovers into AA, from developmental spending decisions in DA, are fully internalized.

Therefore, the extension of the SP auction to include AA provides the appropriate efficiency test for the re-development and the use of eminent domain.

5 Limitations²⁷

This section discusses cheap talk; efficiency; fairness; private assemblies; non-financial motivations; boundaries; practicality.

Cheap talk? Thus far, we have confined the strategy space to announcements of reservation prices and the making of bids. Here, we briefly discuss the possibility that a PD, in an effort to induce higher bids, could communicate to potential bidders an intention to ensure that the reserve price has some specified lower bound. We argue that such communication should be classified as ‘cheap talk’, so long as the auction reserve price always remains a secret to anyone other than the auctioneer, as this secrecy would ensure that the PDs cannot make effective commitments about their announced reservation prices. Truthful announcement remains the dominant strategy for the PD. If so, then the PAs need take no notice of the communication.

We consider only the most obvious communication strategy. Say that a PD believed that a specific potential bidder, say, J, puts a maximum value on the deal which is far higher than that of any other potential acquirer; and the PD believes that, in consequence, J hopes to acquire the property at what the bidder would regard as a bargain price. Then, in an effort to induce J to bid closer to J’s maximum willingness to pay, the PD could communicate to J that the PD intends to nominate a ‘high’ reservation price (say, B’), in order to put a ‘high’ lower-bound under the auction reserve (but not so high as to remove J’s incentive to bid). If the strategy works, the PD and all PDs obtain a higher payoff than otherwise.

However, if the auction reserve is secret to all but the auctioneer, J should reason that, even assuming that the PD has an incentive to make such a communication, there is no incentive to

²⁷ In the longer version of this paper (Pincus and Shapiro 2008a), we discuss its political economy.

carry out the threat: the communication is ineffective because J cannot verify before the auction (or after) that the PD has indeed conveyed the inflated individual reservation price to the auctioneer.

To illustrate that truth-telling remains the dominant strategy, say that the PD believes that, with probability $p < 1$, the communication causes J to raise his or her bid from B_1 to B_2 ; and (for simplicity) that these would be the winning bids in the respective cases. If the PD makes the communication, but in fact nominates the true reservation price, the PD's expected payoff is the share of the expected value of the auction outcome, that is, $\alpha_i[pB_2 + (1-p)B_1]$; alternatively, if the PD communicates and then indeed makes the high nomination, the expected payoff for the PD is lower, at $\alpha_i p B_2$. So, even if J thinks that the PD conjectures that the communication raises the probability of the higher bid, B_2 , J concludes that the PD will not carry out the threat contained in the communication. Therefore, no bidder should react to such a communications strategy, and no PD should adopt the communications strategy; or, if adopting it, should not carry out the threat.

Inefficiently high reserve? The sum of the individual minimum reserve prices, ΣR^*_i , is the lowest auction reserve that would ensure that no property-owner is under-compensated by the auction. However, this theoretically-minimal auction reserve would be attained only if there were perfect correlation between the shares, α_i , and the individual owners' minimum prices, R^*_i . Such a perfect correlation would occur either by remote chance, or by pre-knowledge of the individual reserve prices, the very objects that the SP auction is designed to reveal. Otherwise, the auction reserve r will be greater than the sum of R^*_i , and a sale may fail, even when the highest bid exceeds what is necessary to compensate all the owners (that is, $\Sigma R^*_i < B^* < r$). These lost sales would be universally welfare-increasing with the appropriate re-distribution—they would survive the Kaldor-Hicks efficiency test. Thus, the precision of the market test for efficiency, which is simulated through the SP auction, depends on the correlation between the individual shares and the individual valuations. Specifically, one outlier can reduce the efficiency of the mechanism.

Therefore, it may seem tempting to iterate from the revealed R^*_i , back to the auction reserve. However, there may be no incentive-compatible alternative way to use the individually-preferred

auction reserves, so as to set the SP auction reserve closer to its efficient minimum. If it became common knowledge that the auction authorities planned to use the revealed individual reservation prices to ‘refine’ the auction reserve, then this would provide property owners with incentives not to tell the truth.²⁸ Certainly, also, negotiations among the property owners cannot be relied upon to bring the reserve closer to ΣR^*_i , for the very reasons that lead to the ‘hold-out’ problem itself (section 2)—there is insufficient incentive for truth-telling during such negotiations.

The SP auction provides a sufficient test for efficiency, as well as fairness. To that extent, it seems far superior to the existing practices. But it does not test the necessary condition for efficiency. However, it should be noted that we are imposing a fairness constraint inconsistent with achieving the full efficiency that is achieved by exercises in ‘institutional design’, when those exercises entail maximizing a standard utilitarian social welfare function.

Fairness. The assurance that no property-owner will be under-compensated satisfies the strong Pareto test of fairness. This is no trivial property of the SP auction: the main criticism of the use of eminent domain, for what have been called ‘economic development takings’, arise from claims that the displaced property-owners and others, especially the poor and the weak, have been under-compensated (e.g., Somin 2004).

However, the SP mechanism also implies a distribution of the sellers’ collective surplus. This distribution of surplus may be considered unfair, because it depends on shares that are determined authoritatively. As a practical example, the auction shares may be set equal to the shares of the various properties in the aggregate of the pre-existing assessments of property values for taxation purposes. The efficacy of this depends on the degree to which making the distributional share depend on assessed value cause people to attempt to manipulate these values with private investment.²⁹ From any proceeds of an SP auction, each individual property-owner receives a portion of the successful bid, in amount $\alpha_i B^*$. With one possible exception, property-

²⁸ In the longer version, we derive the incentive effects of setting shares according to assessed value, when it is related to market value; or setting them according to some observable characteristic that is highly correlated with subjective values, the R^*_i .

²⁹ If the valuations for tax purposes include structures, then this raises the issues discussed in the literature sparked by Blume, Rubinfeld and Shapiro (1984). See note 27 above.

owners will thus receive more than their reservation prices for their individual properties (the exception being when the successful bid is exactly equal to the reserve, in which case the person who ‘set’ the reserve receives exactly his or her R_i , no more, no less). Generalizing, proportionately-better deals (defined as a high ratio $\alpha_i B/R_i$) will be received by owners with relatively-high shares of the proceeds, α_i , compared with various other magnitudes of possible normative relevance (e.g., the ratio r_i/r ; or r_i/B).³⁰

Limited to eminent domain? We suspect that the SP auction is not relevant for private re-developments that do not involve the use of eminent domain.³¹ In the present paper, the SP auction occurs after the government has made public its plans for re-development, which are backed by the power of eminent domain. For an SP auction to be used for a private re-development, the private entrepreneur must first invest in creating a re-development plan; the plan would then put up in open auction, along with the right to the property to be assembled. There are three issues. First, the public revelation of plans would seem to reduce, and possibly eliminate, private incentives to engage in the necessary development planning.³² If so, the SP auction mechanism would not seem attractive even when governments ‘declare’ a private development and set aside the usual planning processes. In addition, in proving the revelation theorem, we assumed that property-owners are compelled to participate in the SP auction. For private assembly, participation would be voluntary: and, for reasons connected with the ‘hold out’ problem (section 2), may be impossible to obtain. Finally, we have so far assumed that some public authority fixes the shares of auction proceeds, to be distributed to the existing property owners. For a fully-private alternative, the shares would be determined by some voluntary arrangement. We have not attempted to prove that the revelation theorem would then hold.³³

³⁰ However, we assume that the auction reserve does become common knowledge after the auction.

³¹ Plassmann and Tideman (2007) devise two mechanisms, a Clarke tax and a valuation tax, to solve the ‘hold-out’ problem, and to lead to efficient land assembly without resorting to the use of eminent domain.

³² The creator of the re-development plan would likely have better information than would other bidders; but that may not provide sufficient incentive to engage in development planning, if an SP auction were required. Relevant is that governments, before they auction the rights for exploration of mineral provinces, commonly engage in preliminary investigations of prospectivity, and make the information available to possible bidders. Private firms also investigate the same areas, but keep their information to themselves.

³³ However, in section 3 we show that, once the shares have been determined, trade in shares would not upset the theorem.

Non-financial motivations. For a property owner in AA or DA, the expected financial benefit from a truthful nomination is the premium between the owner's portion of the auction price, $\alpha_i B^*$, and the owner's minimum price for his or her own property, R_i^* . The size of the financial incentive for truthfulness varies usefully for our proposal. When the collective property {DA + AA} is likely to be very much more valuable after the development of DA than otherwise, then the premium for truthfulness could be large. Alternatively, it is 'cheaper' for property owners to ignore the financial incentive when the developmental proposal is in fact a poor one, in terms of economic efficiency.

The owners in AA and DA have been forced into an auction, for reasons that they may not understand and certainly may not appreciate. For ideological or altruistic reasons, some owners may wish to abort the auction and stop the development, by nominating such high minimum prices that no sale takes place. And there is the possibility of a kind of 'holdout' problem arising, from an owner who does not understand or accept the kind of argument that supports the proof of the theorem; or who contemplates an even more-desirable outcome which is inconsistent with the success of the development proposal.

In mundane market transactions, a sale does not take place unless one person's willingness to pay exceeds another's willingness to accept. The fundamental propositions of welfare economics, and especially the notion of gains from trade or exchange, swing on the notion that one person's willingness to accept compensation is the appropriate value to compare with another's willingness to pay. If the willingness to accept is taken at face value, then the SP auction scheme would achieve well in terms of equity and efficiency. However, sometimes when a great difference can exist between willingness to pay and to accept, this leads society, for reasons discussed in Section 2, to set aside the implied veto to collective action that is provided by private ownership of property. The use of eminent domain is such an instance. For these reasons, in the longer version (Pincus and Shapiro 2008a), we discuss some additional financial motives for people not to exaggerate their claims for compensation.³⁴

³⁴ For example, we adopt a version of the self-assessment tax proposal, discussed in Plassman and Tideman (2007).

Boundaries of AA. Re-development of an area like DA produces external effects. In the current arrangements for assessing proposals for re-development, some but not all of those spill-overs are considered. In effect, an administrative or judicial boundary is drawn around an affected area. Here we have nothing to say about what criteria should be used for this purpose. Similar ‘zoning’ has been used by governments to limit the number of households to which compensation is made for the additional noise created by the extension of airport runways or relaxation of airport curfews (e.g., via subsidized sound-proofing), and the like. And, for developments on private properties, it is common for the agency considering the development application to require notification to the owners of a number of contiguous properties, and to receive their active or passive agreement; or to rule on objections.

Practicality. Although the theorem at the core of the paper does not depend on how many properties are involved, the number may have implications for the cost and practicality of the scheme. However, it is the case that, through the current planning and political processes, taken into account are the interests of the properties in the zone declared around the development proper, what we denoted AA (as well as those in DA). The SP auction also takes them into account, through a novel process that arguably has characteristics superior to those of existing processes.³⁵

The mechanism requires the single auction of a collection of properties. To reduce the burden of evaluation and sale of properties outside the PD area itself, presumably the PAs will use the services of firms specialized in the real-estate market for domestic and light commercial properties, or enter into partnerships with them. These brokers may see opportunities for assembling small parcels within AA for re-development of, say, new shops or denser accommodation near the new factory. And presumably, these specialists would seek to sign contracts of lease or re-sale of properties in AA, contingent on the auction being concluded.

³⁵ One way of reducing the number of properties would be to permit owners in AA to opt out of the auction. There is likely to be a selection bias, however, which would damage the efficient test. Nonetheless, it may be a reasonable compromise.

These most likely would include owners in AA, many of whom may wish to re-purchase their own homes, or buy back into the area.³⁶

6 Conclusion

This paper concerns land assembly through eminent domain, when the assembled parcel transferred into private hands, to fulfill a public purpose. We propose an auction mechanism—the ‘SP’ or Strong Pareto auction—to achieve two related goals: to test for the economic efficiency of a proposed change in land use; to arrive at the minimum just compensation for those adversely affected by the change. In terms of welfare economics, it is designed to satisfy the strong Pareto test (within a defined geographical area); and not to fail the weak Pareto test, too often. We suspect that, in the circumstances set out, there is no other mechanism that can satisfy the strict Pareto test of fairness—just compensation—while performing better on the weak Pareto test of efficiency.

Individuals own property, but not absolutely. Some of what they may wish to do with property requires the agreement of others, including government. In effect, there is a collective as well as an individual element to property rights or values. In *Kelo v New London*³⁷ and similar US cases, an essential feature was that the value of an assembled property may be greater than the value of the separate parts; but the individual owners cannot access that enhanced value unless the property is assembled. Assembly is like the production of a local public good. The SP mechanism facilitates the generation of that enhanced, collective value, by rewarding each property owner with at least the value that they subjectively place on owning their property. It is a feasible approximation to the counterpart of the Lindahl-Wicksell mechanism for the finance of public goods proper. It could be adapted to other cases of ‘anti-commons’, in which there are collective rights or values, as well as individual ones, and in which there is additional value from the aggregation of individually-owned pieces of property.³⁸

³⁶ Nothing in the scheme prevents the owners in AA (or DA) from signing of such contingent contracts. However, any such re-sales reduce the extent of continuing internalization of developer decisions, discussed in section 4. Also, governments may need to consider reducing or removing capital gains taxes and transactions taxes and fees on such sales and re-purchases of those ‘forced’ to sell (and later to buy) a property.

³⁷ *Kelo v. City of New London*, 545 U.S. 469 (2005).

³⁸ Pincus and Shapiro (2008b) adapt it to the sale of irrigation water rights.

References

- Alpern, A. and Durst, S. (1997), *New York's Architectural Holdouts*, Dover: New York.
- Blume, L., Rubinfeld, D.L. and Shapiro, P. (1984), 'The taking of land: When should compensation be paid?' *The Quarterly Journal of Economics* 99(1), 71-92.
- Buchanan, J.M. and Yoon, Y.J. (2000), 'Symmetric tragedies: commons and anticommons', *Journal of Law and Economics* 43, 1-13.
- Clark, E.H. (1971), 'Multipart pricing of public goods', *Public Choice* 11, pp. 17-33.
- Dreher, R., and Echeverria, J. D. (2006), '*Kelo's* Unanswered Questions: The Policy Debate Over the Use of Eminent Domain for Economic Development', Georgetown Environmental Law & Policy Institute Report
http://www.law.georgetown.edu/gelpi/current_research/documents/GELPIReport_Kelo.pdf
Accessed June 26, 2009
- Fischel, W.A. (2004), 'The political economy of public use in Poletown: how federal grants encourage excessive use of eminent domain', *Michigan State Law Review*, 929-956.
- Green, J and Laffont, J-J (1977), 'Characterization of satisfactory mechanisms for the revelation of preferences for public goods,' *Econometrica* 45:2, pp. 427-38.
- Groves, T. (1973), 'Incentives in teams', *Econometrica* 41, pp. 617-31.
- Heller, M.A. (1998), 'The tragedy of the anticommons: property in the transition from Marx to markets', *Harvard Law Review* 111, 622-687.
- Hellman, P. (2004), *Shaping the Skyline: The World According to Real Estate Visionary Julien Studley*, John Wiley and Sons, Hoboken, New Jersey.
- Heller, M. and Hill, R. (2007), 'LADS and the Art of Land Assembly'. Available from <http://www.docuticker.com/?p=18808>

Lehavi, A. and Licht, A.N. (2007), 'Eminent Domain Inc.', *Columbia Law Review*, 107 (7), 1704-48.

Merrill, T.W. (1986), 'The economics of public use', *Cornell Law Review*, 72, 61-116

Michelman, F.I. (1967), 'Property, utility and fairness: Comments on the ethical foundations of "just compensation law"', *Harvard Law Review*, 80(6), 1165-1258.

Mongello, L. (2005), 'Walt Disney World History 101—How to buy 27,000 acres and no one notice', <http://www.gather.com/viewArticle.action?articleId=281474976719796> (accessed June 26, 2008)

Montero, J-P. (2008), 'A Simple Auction Mechanism for the Optimal Allocation of the Commons', *American Economic Review*, 98(1), pp. 496-510.

Nosal, E. (2007), 'Private takings', Federal Reserve Bank of Cleveland, *Working Paper No. 07-13* (October).

Parisi, F., Schulz, N. and Depoorter, B. (2006), 'Duality in property: commons and anticommons', *International Review of Law and Economics*, 25, 578-91

Pincus, J.J. (1983), 'Railways and Land Values', *The Journal of Transport History*, Third Series, Vol. 4, No. 2, pp. 35-49. Reprinted in Terry Gourvish, ed., *Studies in Transport History*, Volume 1: *Railways* (Scolar/Ashgate, 1996).

Pincus, J.J. and Shapiro, P. (2008a), 'Efficiency and equity in the use of eminent domain, with local externalities', *Working Paper*, School of Economics, University of Adelaide.

Pincus, J.J. and Shapiro, P. (2008b), 'Between forced resumption and voluntary sale: a mechanism for the collective sale or transfer of irrigation water', *Economic Papers* 27.4 (December), pp. 101-110.

Plassmann, F. and Tideman, T.N. (2007), 'Efficient Urban Renewal Without Takings: Two Solutions to the Land Assembly Problem' (version of March 12, 2007). Available at <http://ideas.repec.org/p/vpi/wpaper/e07-8.html>.

Productivity Commission (2004), *First Home Ownership*, Report no. 28, Melbourne.

Shapiro, P. and Pincus, J.J. (2008), 'The L2H2 Auction: Efficiency and Equity in the Assemblage of Land for Public Use' (unpublished).

Shiller, R. J. (2008), 'Derivative Markets for Home Prices', *Cowles Foundation Discussion Paper*, No. 1648 (March).

Somin, I. (2004), 'Overcoming Poletown: County of Wayne v. Hathcock, Economic Development Takings, and the Future of Public Use', *Michigan State Law Review*, Vol. 2004, No. 4, pp. 1005-1039 (Symposium on *County of Wayne v. Hathcock*)

Starrett, D.A. (1988), *Foundations in Public Economics*, Cambridge Economic Handbooks, Cambridge University Press, Cambridge, MA.

Vickery, William (1961), 'Counterspeculation, auctions and competitive sealed tenders', *Journal of Finance* 16(1), pp. 8-37.