

# Property Is Another Name for Monopoly

## Facilitating Efficient Bargaining with Partial Common Ownership of Spectrum, Corporations, and Land

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Abstract. The existing system of private property interferes with allocative efficiency by giving owners the power to hold out for excessive prices. We propose a remedy in the form of a tax on property, based on the value self-assessed by its owner at intervals, along with a requirement that the owner sell the property to any third party willing to pay a price equal to the self-assessed value. The tax rate would reflect a tradeoff between gains from allocative efficiency and losses to investment efficiency, and would increase in line with expected developments in information technology. The legal and economic implications of this system are explored.

### Introduction

Property rights of all sorts—in real estate, in shares of corporations, and in radio spectrum, to take three diverse examples—give the owner a monopoly over a resource. It is conventional to think that this monopoly is benign. It gives the owner an incentive to invest in improving the property because she receives the entire payoff from its use or sale. This aligns social and private incentives for investment in property. This thinking plays a role in libertarian defenses of private property and in the influential work of legal economists deriving from the Coase Theorem.<sup>2</sup>

However, the monopoly also creates a serious cost that is often overlooked. Because the owner has a monopoly, she will attempt to sell the property at a “monopoly price,” that is, a price that exceeds the price that would be set in a hypothetical perfectly competitive market where many individuals with similar valuations of substantially identical property to the owner compete to make a sale. Just like a normal monopolist, a property owner sets a price that approximates what the seller thinks that the likely buyer’s valuation or reservation price for the property is. Because some buyers will have a valuation that is lower than the announced price but higher than the seller’s valuation, some efficient

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<sup>2</sup> See, e.g., Richard A. Epstein, *A Clear View of the Cathedral: The Dominance of Property Rules*, 106 *Yale L.J.* 2091 (1997).

sales will be blocked or delayed. This inhibits the allocation of property to its most valuable uses, a crucial component of a successful market economy.

When this problem is discussed, authors usually refer to it as the “holdout problem,” most familiar in the context of development of real property and purchases of mineral rights and other natural resources, where projects can fail because sellers hold out for excessive prices. The problem also arises prominently in corporate takeovers, which frequently get bogged down in disputes over the acquisition price. The Federal Communications Commission has spent the last six years preparing an auction and property-redefinition procedure to deal with holdout problems that have inhibited the reallocation of spectrum to more efficient uses.<sup>3</sup> In the area of intellectual property, scholars have long understood that monopoly power granted to inventors through patent law interferes with allocative efficiency—exemplified by the “patent troll” controversy.<sup>4</sup> But the problem is much more general. In every transaction—home and car sales, sales of ordinary goods, and so on—private property creates bargaining problems that interfere with allocative efficiency. To put this problem starkly: allocative efficiency is impossible in a market economy based on private ownership.

This problem was first clearly articulated by the “marginal revolutionaries,” William Stanley Jevons and Léon Walras, who laid the foundation for modern economic analysis. They, together with Henry George, another prominent early economist, believed that the only solution to the monopoly problem was nationalization (through taxation) of many forms of property.<sup>5</sup> Building on their arguments, the socialist economist Abba Lerner advocated state ownership of property, together with a public “mechanism” that distributed possessory rights of property to users who valued them the most.<sup>6</sup> In his Nobel prize-winning work, William Vickrey described how an auction could serve that function.<sup>7</sup> Property is owned in common; the government would allocate temporary possessory and control interests in the property (effectively, leases) to the winners of an auction. Because users would eventually be required to return property to the government, they could not hold out for a monopoly price, or indeed sell their property at all. The modern literature on mechanism design, which was

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<sup>3</sup> Jeffrey A. Eisenach, *Spectrum Reallocation and the National Broadband Plan*, 64 *Fed. Comm. L.J.* 87, 88 (2011); Scott Duke Kominers & E. Glen Weyl, *Holdout in the Assembly of Complements: A Problem for Market Design*, 102 *Am. Econ. Rev.* 360, 362-63 (2012); Paul Milgrom & Ilya Segal, *Deferred-Acceptance Auctions and Radio Spectrum Reallocation* (Stanford Univ. Dep’t of Econ., Working Paper, 2015).

<sup>4</sup> Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 *Tex. L. Rev.* 1991 (2007).

<sup>5</sup> William Stanley Jevons, *The Theory of Political Economy* (1871); Henry George, *Progress and Poverty* (1879); Léon Walras, *Elements of Pure Economics: Or, The Theory of Social Wealth* (1954).

<sup>6</sup> Abba P. Lerner, *The Economics of Control: Principles of Welfare Economics* (1944).

<sup>7</sup> William Vickrey, *Counterspeculation, Auctions, and Competitive Sealed Tenders*, 16 *J. Fin.* 8 (1961).

initiated by Vickrey's contributions, has further refined our understanding of the monopoly problem with private property, and explored ways in which markets can be designed to mitigate it.<sup>8</sup>

However, this literature has ignored the traditional concern with common ownership.<sup>9</sup> As we noted at the outset, the benefit of the monopoly granted by private property rights is that it gives the owner an incentive to invest in the property so as to enhance its value. If the owner can charge whatever price she wants when she sells the property, she will be compensated for an investment that increases its value, because she can increase the price to reflect the increase in value added by her investment. If she cannot—if she must instead return the property to “society” (meaning, to government officials)—then she has weak incentives to invest in it. Probably for this reason, Vickrey's proposal has never been seriously considered by a government.

Instead, the governments of countries where modern market economies exist have addressed the tension between allocative efficiency and investment efficiency by adopting something like a “mixed regime” that consists of strong private property rights for most ordinary types of property and significant deviations in special cases. These deviations include liability rules in tort law for relatively indirect forms of property-rights violation; adverse possession of unused property; time-limited property rights (generally used for intellectual property, but also for a range of government-leased resources like grazing land); redefinition of property rights in light of technological change (such as with the radio spectrum discussed above); public ownership in limited cases (for example, roads); and various jury-rigged forms of government intervention like eminent domain for private uses.<sup>10</sup> In all of these cases, the deviation from private property reduces the holdout problem and thus enhances allocative efficiency, while paying the price in the form of reduced incentives for private investment.

And yet there are serious problems with this mixed regime. First, it does not address the monopoly problem for a huge range of transactions—haggling over the purchase of a used car, months-long negotiations over house sales, corporate acquisitions that can drag on for years. In these cases, investment efficiency is maintained but allocative efficiency is sacrificed. Second, where the regime addresses allocative efficiency by deviating from private property, it relies heavily on

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<sup>8</sup> See, e.g., Roger B. Myerson & Mark A. Satterthwaite, *Efficient Mechanisms for Bilateral Trading*, 29 *J. Econ. Theory* 265 (1983).

<sup>9</sup> By common ownership, we refer to property in which where more than one person has the right to proceeds from a sale. In the case of the Vickrey commons and our proposal, the proceeds from sales are effectively shared by everyone in society in the form of low prices. When lawyers use this term, they frequently have in mind an additional feature: the right of more than one person to occupy and control the property. Joint owners of a house both control the house and share the proceeds from the sale. For purposes of this paper, we use the term only in the first sense, and exclude the second.

<sup>10</sup> See discussion in Section IV.C., *infra*.

bureaucratic or judicial valuations in order to ensure some level of compensation for the forced sale or transfer, or it denies compensation altogether. But the denial of compensation eliminates investment incentives, and imperfect government-supplied valuations and other forms of intervention interfere both with allocative efficiency and investment efficiency. Thus, while the deviations from private property may produce better outcomes for society than a system without such deviations, they fall far short of the social optimum. Our present system mixes elements of an extreme form of capitalism with the more naïve forms of central planning.

In this Article, we propose a third way, one that involves a system of self-assessed property taxation first proposed by Arnold Harberger for the purposes of raising tax revenue.<sup>11</sup> Under this Harberger tax, as we call it, people periodically report valuations of their property to a government registry; pay property taxes based on these valuations; and are required to sell their property at these valuations to any buyer. Thus, a key component of this proposal is that buyers can force sales—reversing a longstanding element of private property, which is that the person who owns property keeps it until she consents to sale. The Harberger tax is a radical departure from our current system of private property in one sense—people are no longer “owners;” they are more like lessees—and yet it at the same time amplifies the operation of the market economy rather than curtailing it. People maintain the freedom to hold onto their property if they are willing to self-assess a high valuation; economic decisions are made by individuals, not by the government; and market competition remains the dominant force in the economy, indeed gains in importance relative to the current system. From a legal standpoint, the Harberger system creates a type of property that replaces the “right to exclude” with a “right to exclude anyone who does not pay the self-assessed price.” Another way to think of our proposal is as a kind of “partial ownership,” halfway between private ownership (the current system) and common ownership (the system advocated by socialists like Lerner).

We build our argument on a proposal by one of us (Weyl) and Anthony Zhang, who prove mathematically the superiority of the Harberger tax under standard economic assumptions.<sup>12</sup> Our

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<sup>11</sup> See Arnold C. Harberger, *Issues of Tax Reform for Latin America*, in *Fiscal Policy for Economic Growth in Latin America* 116-21 (Joint Tax Program of the Organization of American States eds., 1965). For an early review and criticisms, see Daniel M. Holland & William M. Vaughn, *An Evaluation of Self-Assessment under a Property Tax*, in *The Property Tax and Its Administration* 79 (Arthur D. Lynn, Jr. ed., 1969). The idea was further developed by Saul Levmore; see Saul Levmore, *Self-Assessed Valuation Systems for Tort and Other Law*, 68 *Va. L. Rev.* 771 (1982), and has received renewed attention in recent years in the law and economics literature; see, e.g., Michael Abramowicz, *The Law-and-Markets Movement*, 49 *Am. U. L. Rev.* 327, 364-73 (1999); Lee Anne Fennell, *Revealing Options*, 118 *Harv. L. Rev.* 1399, 1444 (2005); Daphna Lewinsohn-Zamir, *Identifying Intense Preferences*, 94 *Cornell L. Rev.* 1391, 1398-99 (2009); Richard A. Epstein, *The Use and Limits of Self-Valuation Systems*, 81 *U. Chi. L. Rev.* 109, 111 (2014).

<sup>12</sup> E. Glen Weyl & Anthony Lee Zhang, *Ownership of the Means of Production* (U. of Chi. Coase-Sandor Inst. for Law & Econ., Research Paper No. 765, 2016).

contribution in this Article is to further develop the Weyl and Zhang proposal, use the underlying theory to shed light on themes in the literature on property law, and address the practical and legal challenges that it would meet.

In Part I, we set out the theory behind the Harberger tax. We argue that while private property enhances investment efficiency but interferes with allocative efficiency, and common ownership interferes with investment efficiency but enhances allocative efficiency, the Harberger tax optimizes across both forms of efficiency. We also address the magnitude of the optimal Harberger tax, arguing that the rate of taxation will be higher in cases where asset markets are illiquid (asymmetric information about values is rampant) and lower in cases where the value of property depends heavily on investments that are difficult for an outsider to observe.

In Part II, we address design issues. The Harberger tax requires legal and technological infrastructure that does not yet exist. We explore the forms that it might take. In Part III, we discuss some practical challenges, including the redistributive implications of the tax; its fairness when people have strong attachments to property; how a regime of “forced sales” may disrupt planning; and how the system can be monitored. And in Part IV, we describe how the Harberger tax might work for different types of property. Here, we show areas in which implementation of the Harberger tax would be straightforward (domain names, broadcast spectrum), and then address some more complicated cases (corporate acquisitions, real property, personal property). A theme of this section is that many of the features of the Harberger tax that people might find objectionable already exist in hidden form in the current mixed system. Furthermore, we argue that a number of new technologies are making the benefits of Harberger taxation greater and its optimal rate higher, suggesting that the gains from implementing such a system will grow in coming years.

Our arguments reach deep into the roots of economic theory. Nineteenth-century critics of Adam Smith’s theories of the market economy identified private property as one of the chief culprits in what they saw as wasteful economic relationships, as well as systems of domination. While the critics did not identify the monopoly problem in so many terms, their concerns about private property—that those who owned it could extract rents from those who did not—were related to it.<sup>13</sup> Many of them—including Saint-Simon, Proudhon, Owen, Fourier, Marx, and Engels—called for common ownership of some sort.<sup>14</sup> Yet they were never clear about the form that common ownership

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<sup>13</sup> See Samuel Bowles & Richard Edwards, *Understanding Capitalism: Competition, Command, and Change in the U.S. Economy* 73-83 (1985).

<sup>14</sup> See Alexander Gray, *The Socialist Tradition: Moses to Lenin* (1946).

would take, or how it would address the incentive problems that preoccupied Smith. Even the leading socialist economists of the twentieth century—Oskar Lange, Abba Lerner, and Fred Taylor—ignored the problem of implementation, assuming that “all that was necessary was a large calculation” to satisfy the equation of general equilibrium theory, in other words, central planning.<sup>15</sup> Ludwig von Mises<sup>16</sup> and Frederick Hayek pointed out the flaw in this reasoning: central planners lack the information they need to make allocative decisions.<sup>17</sup> People’s valuations are private information; the genius of the market is its capacity for disseminating this information from consumers to producers through the price system. The alternative was massive misallocation of resources—the production of goods no one wanted—that was characteristic of real-world socialist economies like that of the Soviet Union.<sup>18</sup>

Vickrey showed that a type of common ownership—one in which the government auctioned use or possessory rights to people—could lead to allocative efficiency.<sup>19</sup> His work helped initiate the literature that became known as “mechanism design.”<sup>20</sup> Two other economists writing in the literature—Myerson and Satterthwaite—finally identified the monopoly problem in a mathematically rigorous fashion, proving that private property was inconsistent with allocative efficiency.<sup>21</sup> This work, along with Vickrey’s, would stimulate a search for efficient market mechanisms, and lead to the widespread adoption of auctions for administrative property, especially the radio spectrum.<sup>22</sup>

However, this literature never addressed the problem of investment efficiency. The notion that common ownership can undermine investment in property dates at least back to Aristotle’s *Politics*, but it became a central theme of the economics literature after Garrett Hardin’s observations about the neglect of common resources.<sup>23</sup> Formal economic analysis by Sanford Grossman, Oliver Hart and John Moore emphasized the role of property rights in encouraging owners to make

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<sup>15</sup> Oskar Lange & Fred M. Taylor, *On the Economic Theory of Socialism* (Benjamin E. Lippincott ed., 1938); Lerner, *supra* note \_\_\_\_.

<sup>16</sup> Ludwig von Mises, *Economic Calculation in the Socialist Commonwealth* (S. Adler trans., 2012), available at [https://mises.org/system/tdf/Economic%20Calculation%20in%20the%20Socialist%20Commonwealth\\_Vol\\_2\\_3.pdf?file=1&type=document](https://mises.org/system/tdf/Economic%20Calculation%20in%20the%20Socialist%20Commonwealth_Vol_2_3.pdf?file=1&type=document).

<sup>17</sup> Friedrich A. Hayek, *The Use of Knowledge in Society*, 35 *Am. Econ. Rev.* 519 (1945). See also Samuel Bowles, *Microeconomics: Behavior, Institutions, and Evolution* 475-76 (2004), for a discussion of the mid-century debates.

<sup>18</sup> These critiques would eventually lead modern socialist thinkers to advocate various hybrid economic relationships like workers’ cooperatives, which would have placed production under greater democratic control, and stronger economic rights, which would make workers less dependent on their employers. See, e.g. Samuel Bowles & Herbert Gintis, *Democracy and Capitalism: Property, Community, and the Contradictions of Modern Social Thought* (1986); Alec Nove, *The Economics of Feasible Socialism Revisited* (2d ed., 1991).

<sup>19</sup> See Vickrey, *supra* note \_\_\_\_.

<sup>20</sup> See Leonid Hurwicz & Stanley Reiter, *Designing Economic Mechanisms* (2006).

<sup>21</sup> Myerson & Satterthwaite, *supra* note \_\_\_\_.

<sup>22</sup> See the introduction of Paul Milgrom, *Putting Auction Theory to Work* (2004).

<sup>23</sup> Garrett Hardin, *The Tragedy of the Commons*, 162 *Sci.* 1243 (1968).

productive investments.<sup>24</sup> However, these arguments were met with some skepticism by proponents of the Vickrey and Myerson-Satterthwaite logic. In particular, Paul Milgrom and William Rogerson argued that to the extent that an individual's investment increases only *her own* use value for a good, a competitive auction provides optimal incentives.<sup>25</sup> Individuals reap the benefits of the investment exactly to the extent that they end up owning the good in the future, which is the only case when it is useful to make the investment. However, as Yeon-Koo Che and Donald Hausch argued, most investments benefit future potential owners as well as the owner who makes the investment.<sup>26</sup> They consider a case when the investment is purely "cooperative" in that it raises the buyer's value rather than that of the seller. In this case they show that schemes like Vickrey's perform very poorly, worse in fact than simple property ownership, in encouraging investment.

Meanwhile, a parallel literature in law and economics developed. It originated in Ronald Coase's classic article, *The Problem of Social Cost*, in which he argued that if transaction costs are low, the allocation of property rights is irrelevant from the standpoint of efficiency, because property will be transferred from lower-valued to higher-valued uses through bargaining.<sup>27</sup> While a huge amount of controversy has developed over what exactly Coase meant, it is clear that in the hands of many subsequent authors beginning with George Stigler's third edition of *The Theory of Price*,<sup>28</sup> the "Coase Theorem" came to stand for the idea that private bargaining from strong and clearly-defined property rights frequently makes regulation unnecessary, particularly when a small number of people are affected by the externality in question, and hence transaction costs are low. In the Coasean world of low transaction costs, the monopoly problem is simply assumed away, which means that private property is optimal because it enhances investment efficiency.<sup>29</sup>

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<sup>24</sup> Sanford J. Grossman & Oliver D. Hart, *The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration*, 94 *J. Pol. Econ.* 691 (1986); Oliver D. Hart & John Moore, *Property Rights and the Nature of the Firm*, 98 *J. Pol. Econ.* 1119 (1990).

<sup>25</sup> Paul Milgrom, *Adverse Selection without Hidden Information* (U. of Cal., Berkeley, Worker Paper 8742, 1987) and William P. Rogerson, *Contractual Solutions to the Hold-Up Problem*, 59 *Rev. Econ. Stud.* 777 (1992).

<sup>26</sup> Yeon-Koo Che & Donald B. Hausch, *Cooperative Investments and the Value of Contracting*, 89 *Am. Econ. Rev.* 125 (1999).

<sup>27</sup> R. H. Coase, *The Problem of Social Cost*, 56 *J. Law & Econ.* 837 (2013). Some limited empirical work confirms the lawyer's intuition that bargaining can be extremely difficult, especially in the sorts of examples that Coase preferred. See Ward Farnsworth, *Do Parties to Nuisance Cases Bargain after Judgment? A Glimpse inside the Cathedral*, 66 *U. Chi. L. Rev.* 2, 373-436 (1999); Michael Heller, *The Gridlock Economy: How Too Much Ownership Wrecks Markets, Stops Innovation, and Costs Lives* (2008).

<sup>28</sup> George J. Stigler, *The Theory of Price* (3d ed., 1966).

<sup>29</sup> This can be seen in the three major textbooks on law and economics. All three textbooks give great weight to the investment problem as a justification for private property: if private property did not exist, then people would not invest in improving property since they could not be sure that they would profit from the returns on the investment. See Steven Shavell, *Foundations of Economic Analysis of Law* 11-19 (2004); Robert Cooter & Thomas Ulen, *Law & Economics* 76-

This idea has made its way into the law and economics of property literature. The standard view is that private property is “normal” because competitive markets prevent owners from exploiting their formal monopoly power over their property; public ownership and restrictions on private property (in the sense of the owner’s power to refuse to alienate the property) are justified in only exceptional cases involving public goods, spillovers, “natural monopolies” (typically meaning cases where market power is very high and price distortions extreme), and assembly problems. Merrill illustrates this view in a striking way. After correctly noting that “[a]ll property rights confer a monopoly,” he says, puzzlingly, “[m]onopolies are troubling only when they confer market power.”<sup>30</sup> Of course, monopolies by definition confer market power. What Merrill probably means to say is that the monopoly created by private property is often not a matter of public concern because, when there is (limited) competition, the prevailing price will exceed the (optimal) competitive price by only a small amount, which means that expensive antitrust litigation or government regulation will not be justified.

But Merrill’s mischaracterization of the problem is important. Probably under the influence of the Coase theorem, law and economics scholars artificially divide the world into “zero (or low) transaction cost” and “high transaction cost” and claim that regulation (including public ownership) is appropriate only in the latter, leaving private property to prevail in the (implicitly “normal”) zone of the former. But the monopoly problem is always a matter of degree; and, because the monopoly problem is a type of transaction cost, transaction costs are also never zero but instead a matter of degree. This means that advances in technology and the design of institutions, including the Harberger tax itself, may shrink the zone in which private property is superior.

At the same time, scholars writing in the Coasean tradition have understood, from the very beginning, that the state must play a role in facilitating bargains. In their influential early article on property rules and liability rules, Calabresi and Melamed pointed out that liability rules may be justified when bargaining is not possible.<sup>31</sup> If pollution from a factory harms thousands of people, it may not be possible for the victims to pay the factory to stop, as imagined by Coase. In this case, the courts

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81 (6th ed., 2012); Richard A. Posner, *Economic Analysis of Law* 40-42 (9th ed., 2014). The textbooks give only passing attention to the monopoly problem. While they acknowledge that holdout problems, and related problems of strategic behavior, can interfere with the transfer of property, they largely consider these problems as confined to cases where the use of property affects a large number of people, as in the case of factory pollution. See Shavell, *supra* note \_\_, at 87-91. Cooter & Ulen briefly address this issue at Cooter & Ulen, *supra* note \_\_, at 93-94; see also Posner, *supra* note \_\_, at 52.

<sup>30</sup> Thomas W. Merrill, *Private Property and Public Rights*, in *Research Handbook on the Economics of Property Law* 91 (Kenneth Ayotte & Henry E. Smith eds., 2012).

<sup>31</sup> Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 *Harv. L. Rev.* 1089 (1972). See also Robert Cooter, *The Cost of Coase*, 11 *J. Legal Stud.* 1 (1982) for a broader discussion of the problems with the Coase theorem.

step in and force a bargain by setting a price equal to the harm suffered by the residents. Judicial valuation would remain minimal for two-party cases on the assumption that judicial valuation is inherently inaccurate, less accurate than the prices set by parties themselves. But Kaplow & Shavell later showed that liability rules can be superior to property rules even for the two-party case when bargaining is possible, as long as it is not costless.<sup>32</sup> As long as judicial valuation is accurate on average, the benefit from being able to force a sale exceeds the cost from inaccurate valuation. Segal and Whinston amplify this logic by showing that this more efficient fallback option provides a better basis for bargaining to efficiency.<sup>33</sup> The reason is that the parties will settle on a price against the background expectation of an on-average accurate judicial valuation.

However, Segal and Whinston also show that, unlike shared property rights, liability rules do not allow full efficiency or eliminate the monopoly problem because judicial valuations, even when accurate on average, are never as accurate as private valuations are. Furthermore, Kaplow and Shavell argue that such valuations may not even be accurate on average from the perspective of the traders, as they may both have information unavailable to the court. In this case, they argue that property rules may actually be superior to liability rules. Whichever is the case, liability rules leave much to be desired in resolving the monopoly problem.

In recent years, law and economics scholars have begun to look for inspiration in the mechanism design literature. Ayres & Balkin propose a mechanism in which (say) a factory may pollute the property of a neighboring laundry if (1) the factory offers to pay the laundry its expected loss from the pollution, and (2) the laundry declines to exercise a “take-back option” under which it pays an exercise price of some higher amount.<sup>34</sup> Lee Fennell proposes a similar mechanism except that the factory, when it exercises its initial option to pay, must also state a price at which the laundry may exercise its option to retake the entitlement. These and related proposals<sup>35</sup> may lessen the monopoly

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<sup>32</sup> Louis Kaplow & Steven Shavell, Property Rules Versus Liability Rules: An Economic Analysis, 109 Harv. L. Rev. 715 (1996). They discuss some exceptions.

<sup>33</sup> Ilya Segal & Michael D. Whinston, Property Rights and the Efficiency of Bargaining (Mass. Inst. of Tech. Dep’t of Econ., Working Paper, 2014).

<sup>34</sup> Ian Ayres & J. M. Balkin, Legal Entitlements as Auctions: Property Rules, Liability Rules, and Beyond, 106 Yale L.J. 703 (1996).

<sup>35</sup> The literature has ramified into multiple competing proposals along similar lines. See, e.g., Sergey I. Knysh, Paul M. Goldbart & Ian Ayres, Instantaneous Liability Rule Auctions: The Continuous Extension of Higher-Order Liability Rules (Yale Law School, Working Paper, 2004); Abraham Bell & Gideon Parchomovsky, A Theory of Property, 90 Cornell L. Rev. 531 (2005). All of these proposals share the property that they may, under some circumstances, improve the efficiency of allocation, but none do so generally, nor do any of them quantify the protection of investment incentives, or optimally trade-off these two objectives.

problem by enabling the buyer to force the monopolist to transact at a price that reflects the monopolist's private information about its valuation.

However, these mechanisms share a number of flaws. First, they all rely to a significant extent on judicial valuations and the setting of discretionary prices and thresholds by third parties that may be poorly informed. This implies that these mechanisms may actually harm allocative efficiency in some cases and will tend to be relatively ineffectual at improving it. Second, to the extent that these mechanisms reveal any private information, they do it ex-post when much of the opportunity for supplying countervailing incentives is past and then require the entitlement taker to assess a valuation on the spot. This is likely to be more challenging than allowing the entitlement holder, who has held the entitlement for an extended period during which she can reflect on its value, to set the valuation ex ante. Third, these proposals tend to undermine investment incentives; liability protection of an asset may actually create an incentive to harm assets in ways that make them less attractive to a prospective taker, unless the objective assessor can correctly perceive the improved value of the asset.<sup>36</sup> Finally, all of these mechanisms are quite elaborate, making them difficult to imagine implementing in practice and raising concerns about their sensitivity to changes in the environment in which they are analyzed.

As we turn to our proposed Harberger tax, we should acknowledge that, for some readers, it will seem like science fiction, too radical to be taken seriously. But while some applications of the proposal would change ordinary life in surprising and possibly discomfiting ways, other applications—for example, to the broadcast spectrum—are perfectly ordinary, and only modestly different from approaches that the government already uses. In exploring how the Harberger tax would apply in more sensitive areas, including residential real estate and personal property, we hope to encourage readers to question their intuitions about how people think about and interact with property, including the extent to which people's personal attachments to property may be endogenous to the regime of property rights that happens to prevail. That said, we acknowledge that only empirical evidence can resolve questions about whether our system would work well or poorly. We should be clear, however,

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<sup>36</sup> Fennell's scheme does this in an even more extreme way, as it gives the entitlement-taker the right to make the offer, giving the taker an incentive to extract all benefit from investment from the entitlement holder. Lee Anne Fennell, *Property and Precaution*, 4 *J. Tort L.* 2 (2011).

that we do not envision it applying to certain markets, including labor (human capital) and markets in intellectual property, where incentives are more complicated than in the core setting that we analyze.<sup>37</sup>

## I. Theory

In this section we discuss the fundamental ideas behind our proposal.<sup>38</sup> We begin by explaining how private ownership interferes with allocative efficiency relative to the system of common ownership advocated by Vickrey. Next, we point out that private ownership generates superior incentives for investment. In the final two sections, we show how “partial common ownership”—a mixed version of private and common ownership—optimizes across the two forms of efficiency, and explain how the Harberger tax fulfills this function.

### A. Allocative Efficiency

A central economic problem in a variety of settings is that of ensuring capital—including money, land, machines, and other assets—is allocated to its most productive uses. In traditional economic models, this problem is assumed away: capital assets move to their most productive uses because the people or firms who can use it most productively can pay the highest prices to buy it from those who cannot. However, in the real world this problem of allocative efficiency often takes center stage. As Philip Hoffman famously argued, England may have industrialized earlier than France and other countries because English law recognized a type of compulsory purchase, called enclosure. Roughly, enclosure allowed expropriation of large areas of land on the urban periphery for use in manufacturing, while no similar system of compulsory purchase existed in France.<sup>39</sup> In modern times, mergers and takeovers of corporations represent a large share of aggregate economic activity, nearly half a trillion dollars each year—and yet they frequently fail because of bargaining impasses.<sup>40</sup> Real estate development is also hampered because it requires the assembly of multiple plots of land whose owners hold out for high prices. The solution is a form of government expropriation—takings for “private use”—which has been enormously controversial.<sup>41</sup> A final example is the misallocation of

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<sup>37</sup> Nor does our argument commit us, as one reader thought, to advocating our system for human organs and other goods that people have traditionally felt should not be subject to market forces.

<sup>38</sup> For a more formal treatment, see Weyl & Zhang, *supra* note \_\_\_\_.

<sup>39</sup> Philip T. Hoffman, *Institutions and Agriculture in Old Regime France*, 16 *Pol. & Soc’y* 241 (1988).

<sup>40</sup> Sanford J. Grossman & Oliver D. Hart, *Takeover Bids, The Free-Rider Problem, and the Theory of the Corporation*, 11 *Bell J. Econ.* 42 (1980). See also Michael C. Jensen & Richard S. Ruback, *The Market for Corporate Control: The Scientific Evidence*, 11 *J. Fin. Econ.* 5 (1983), and Andrei Shleifer & Robert W. Vishny, *A Survey of Corporate Governance*, 52 *J. Fin.* 737 (1997).

<sup>41</sup> See Ilya Somin, *The Limits of Backlash: Assessing the Political Response to Kelo*, 93 *Minn. L. Rev.* 2100, 2108-14 (2009).

usage rights for the electromagnetic spectrum, which the government has tried to cure by introducing auctions.<sup>42</sup> Chang-Tai Hsieh and Pete Klenow have argued that the misallocation of capital assets to insufficiently productive uses can explain an important part of the differentials in output across countries.<sup>43</sup>

The source of misallocation in all these examples is the same: the owner of private property will “hold out” for a price that the buyer may not be able to pay, leading to delay or a failed transaction even when the buyer can use the property more productively than the owner can. This problem was first identified by William Stanley Jevons, one of the founders of neo-classical economics. The title of this Article is a quote from his 1879 second edition of his classic, *The Theory of Political Economy*.<sup>44</sup> However, this idea takes its sharpest formal manifestation in the classic analysis of Roger Myerson and Mark Satterthwaite in the early 1980s, for which Myerson eventually won the Nobel prize.<sup>45</sup> Myerson and Satterthwaite consider a case in which there is a single current owner and single potential buyer for an asset. They show that if it is not known with certainty by both parties that the buyer values that asset more than the seller,<sup>46</sup> and that the seller has an absolute right to refuse to sell if she wishes to, then, assuming both agents act in their economic self-interest, there exists no procedure for bargaining that ensures that the good is transferred to the buyer whenever the buyer values the good more than the seller does, which is what is meant by “allocative efficiency.”

The idea behind this *Myerson-Satterthwaite Theorem* is that if, for example, the seller is asked to make an offer to the buyer, she will typically demand more than her reservation price for the asset because she wishes to maximize her profit on the sale. This will lead some buyers who would have been willing to pay the seller’s reservation value, but are unwilling to pay the price she quotes, to refuse to purchase. The buyer, on the other hand, if asked to make an offer to the seller will offer less than her reservation price for purchase, again to enjoy more of the surplus associated with the trade. This will lead some sellers who would have been willing to sell at the buyer’s reservation price to refuse to sell. Both outcomes inefficiently reduce the probability that the asset moves from the lower-value user to the high-value user. Any other bargaining protocol involves some combination of the two sides

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<sup>42</sup> Milgrom, Putting Auction Theory to Work, *supra* note \_\_; Jeffrey A. Eisenach, Spectrum Reallocation and the National Broadband Plan, 64 Fed. Comm. L.J. 87, 88 (2011); Scott Duke Kominers & E. Glen Weyl, Holdout in the Assembly of Complements: A Problem for Market Design, 102 Am. Econ. Rev. 360, 362-63 (2012); Paul Milgrom & Ilya Segal, Deferred-Acceptance Auctions and Radio Spectrum Reallocation (Stanford Univ. Dep’t of Econ., Working Paper, 2015).

<sup>43</sup> Chang-Tai Hsieh & Peter J. Klenow, Misallocation and Manufacturing TFP in China and India, 124 Q.J. Econ. 1403 (2009).

<sup>44</sup> Jevons, *supra* note \_\_.

<sup>45</sup> Myerson & Satterthwaite, *supra* note \_\_.

<sup>46</sup> In other words, if information is asymmetric.

determining the price, or an outsider with no knowledge of the correct price determining it, and thus they all lead to an inefficient reduction in the probability of turnover.

The Myerson-Satterthwaite Theorem would be of only academic interest if its only implication were that it is theoretically impossible to achieve efficient allocation of assets under normal economic conditions. On this view, a deadweight cost in every transaction is the price of living in a market economy. However, Vickrey showed that if a good is owned by a whole community of individuals, with equal shares of its rental value being divided among all, the efficient allocation of the asset at any period of time can be achieved by a simple system of competitive bidding.<sup>47</sup> In the most familiar version of the idea, property is owned in common—and hence managed by the government. The government distributes the right to possess, use, or control property for temporary periods by conducting an English auction, in which the price of the good rises until only one bidder remains. Because the price paid by this bidder conditional on winning the auction is independent of her decision to remain in the auction, she has an incentive to stay in if, and only if, the current price is below her reservation price. This ensures that the winner of the auction is the individual with the greatest reservation price and thus that the asset is allocated efficiently. Imagine, to take a concrete example, that the government owns apartment blocks and auctions off one-year leases to the apartments. Every year, everyone would enter the auction, and the apartments would be reallocated to the people who value them the most. We call this system the “Vickrey Commons.”

Why does a Vickrey Commons achieve allocative efficiency when private ownership does not? The fundamental reason is competition: under Vickrey’s system, all individuals are on even footing; each must outbid the other to achieve control. By contrast, under private ownership the current owner has a monopoly right to retain the good unless she finds it sufficiently profitable to transfer the good to another. This fundamental asymmetry gives her an interest in holding out for a profit while a participant in a Vickrey auction lacks the ability to hold out in this way. In this sense, there is a fundamental tension between two concepts commonly aligned with each other: privately owned property and free competition.

The monopoly problem is most serious when property is illiquid, which typically arises when property is idiosyncratic. Such property is hard to value because it cannot be easily compared to other pieces of property. As a result, it takes a long time for people to agree on a price, if they agree at all,

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<sup>47</sup> Vickrey, *supra* note \_\_\_\_.

and in the process much effort may be wasted. Artwork is highly illiquid; houses are fairly illiquid; pork bellies and ball bearings are liquid.

## **B. Investment Efficiency**

The Vickrey Commons has a flaw: it does not give people an incentive to take care of, or invest in, the assets under their control.<sup>48</sup> If a person wishes to retain an asset, she must outbid other potential buyers whenever the asset is returned to the Commons and put up for bid again. This means that if she increases the value of the assets through a private investment, she will be required to pay a higher price in order to retain it—and that extra amount will offset the increase in value, ensuring that she obtain no return on her investment. Indeed, people do not even have an incentive to invest in maintenance of a good to the extent that the investment maintains the value of the good beyond the next auction.

In our example of the apartments, consider the incentive of someone who leases a particular apartment. The person would like to give the walls a coat of fresh paint. If she does so, the apartment will be worth more for both her and for other potential tenants when the next auction is held. This means that she will need to raise her bid in order to retain the apartment, or otherwise allow someone else to enjoy the benefit of the new paint job. Yet she incurs the full cost of the painting. Because she internalizes the costs of any investment she makes in the apartment, but not all the benefit of those investments, her incentive is to neglect the apartment.

By contrast, private property provides optimal incentives for such capital investments because any increase in the value of the asset to both the seller and the potential buyer is perfectly captured by the seller. The owner of an apartment benefits from the fresh coat of paint as long as she remains in the apartment or, if she sells it, via the price premium that the buyer pays in return for an apartment with new paint. Private property rights enable the owner to capture the return on her investment by charging a high price.

In sum, while common ownership allows for efficient allocation, private ownership optimizes incentives for capital investment.

## **C. The Case for Partial Common Ownership**

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<sup>48</sup> Interestingly, the Vickrey Commons, and the systems of common ownership we advocate below, do provide efficient incentives for individuals to make a more narrow kind of *selfish investment*, one augmenting only their own idiosyncratic personal value for the asset and not its objective capital value. Individuals make efficient selfish investments in the Vickrey commons because in situations where they expect to win the auction they capture the full value of these investments, while in situations where they expect to lose the auction, and thus such investments have no value as they will be wasted once a more efficient owner takes over the asset, they do not benefit from them.

A possible response to the argument so far is that private property rights should be used for property where investment incentives are more important than allocative efficiency, and that common property should be used where allocative efficiency is more important than investment efficiency. However, there is a third possibility: “partial” common ownership, where allocative efficiency and investment efficiency are optimized within a single property regime. This possibility is illustrated by an ingenious proposal of Peter Cramton, Robert Gibbons and Paul Klemperer in the late 1980s, and elaborated upon by Ilya Segal and Michael Whinston in recent years.<sup>49</sup> The basic idea is that by sharing ownership one can deter the exercise of monopoly power.

Consider a partnership of two individuals who no longer wish to work together and seek to dissolve it. Each person submits a bid for the value of the company and the higher bid wins. Whoever wins must buy out the share of the other partner at the average of the two prices. To see how this system gives each partner at least some incentive to be truthful, imagine first the case where the current shares align precisely with the chance that each partner wins. Here, each party has an incentive to bid precisely her reservation value. Suppose that partner A has a 60% ownership and anticipates she will win the bidding process with 60% probability. If she raises her bid beyond some level, this increases the amount she must pay with probability 60%, but the amount applies to only 40% of the total value of the firm as this is the fraction she must buy from her partner. On the other hand, her higher bid also raises the amount she is paid if she loses the auction, which occurs with 40% probability but applies to the 60% she owns. These two incentives exactly balance and thus she has no incentive to try to manipulate the prices and instead simply bids her reservation value. Even if the shares do not perfectly line up with the chances of each party winning, any degree of shared ownership will dampen the incentive of each partner to exaggerate or understate her value by forcing her to confront the countervailing incentive she faces if she ends up on the opposite side of the deal to the one she anticipated.

An important advantage of this system over the Vickrey Commons, first noted by one of us in paper written with Anthony Zhang, is that it preserves investment incentives to some extent.<sup>50</sup> An individual with a 90% ownership stake in a partnership still has 90% of the incentive to invest that an individual with a 100% stake does. If she ends up winning the bidding process, she retains the good

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<sup>49</sup> Peter Cramton, Robert Gibbons, & Paul Klemperer, *Dissolving a Partnership Efficiently*, 55 *Econometrica* 61 (1987); Ilya Segal & Michael D. Whinston, *A Simple Status Quo that Ensures Participation (with Application to Efficient Bargaining)*, 6 *Theoretical Econ.* 109 (2011). These ideas have been pursued in the law and economics literature as well; see, e.g., Claudia M. Landeo & Kathryn E. Spier, *Shotguns and Deadlocks*, 31 *Yale J. Reg.* 143 (2014); Claudia M. Landeo & Kathryn E. Spier, *Irreconcilable Differences: Judicial Resolution of Business Deadlock*, 81 *U. Chi. L. Rev.* 203 (2014).

<sup>50</sup> Weyl & Zhang, *supra* note \_\_\_\_.

(and thus the investment) and must pay only 10% of it to her partner for the right to enjoy this value. If she loses the process, her partner pays her 90% of the value of the investment to settle. Thus, while the Vickrey Commons gives no one any incentive to invest in the asset, partial common ownership gives all individuals an incentive to invest in proportion to their ownership shares.

Shared ownership is thus a promising way to organize a partnership. However, the scheme that we described works only for partnerships, a relatively unusual form of ownership. In the next section, we describe how the logic behind it can be applied more generally.

#### **D. The Harberger Tax**

In 1965, the economist Arnold Harberger proposed a simple property tax that was designed to raise revenue in developing countries where institutional capacity was weak. The key to the tax was that property owners were required to “self-assess”—to announce periodically how much they valued their property and pay taxes on the basis of the announced valuation—while being required to sell the property at the self-assessed value if anyone wanted to buy it.<sup>51</sup> Nicholas Tideman and Saul Levmore subsequently embellished upon the idea.<sup>52</sup> While they (especially Harberger and Levmore) saw this procedure primarily as a means to raise revenue, the Harberger “tax” can also be seen as an element in a new kind of private property, a system of partial common ownership that provides incentives closely related to those highlighted by Cramton, Gibbons, Klemperer, Segal and Whinston.

Under this system, there would be a registry of all assets owned by individuals, which we henceforth refer to as the *cadaster* and anthropomorphize as the enforcer of all the rules of the system.<sup>53</sup> Individuals would list all of their possessions in the cadaster with a self-assessed value assigned to them. This self-assessed value would serve two purposes, corresponding to the events of sale and purchase in the Cramton-Gibbons-Klemperer scheme.<sup>54</sup> On the one hand, the owner would be required to sell any asset at the value listed in the cadaster to any buyer willing to pay this price. On the other hand, the owner would pay a tax on the asset at a specified rate.

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<sup>51</sup> Harberger, *supra* note \_\_\_\_.

<sup>52</sup> Levmore, *supra* note \_\_\_\_.

<sup>53</sup> Of course a cadaster is inanimate and in many implementations it would be cadastral authorities that would implement the system. However, we choose to view the cadaster itself as an agent because, as we discuss below, our system does not require any discretionary authority and could be implemented using, for example, an algorithm or a distributed/decentralized blockchain to avoid the possibility of the system being abused. As such we prefer to think of the system as either being itself the enforcement agent or as an impersonal agent of the broader community rather than vesting any power in central authorities who might abuse or manipulate it, given that our goal is precisely to circumvent the reliance of past systems on arbitrary centralized judicial discretion.

<sup>54</sup> Cramton et. al., *supra* note \_\_\_\_, at 616.

To see how this tax serves a role similar to the shared ownership system highlighted by Cramton, Gibbons and Klemperer, suppose that the annual Harberger tax rate were set equal to the probability that a buyer who values the asset more than the seller materializes in a given period. (We call this probability the “turnover rate,” meaning the rate at which the asset moves into another person’s hands.) Suppose that the tax rate and the turnover rate are both 30%. If the owner raises her sale price above her reservation value, she benefits from the higher sale price 30% of the time—when those higher-value buyers turn up. Her benefit from raising the price would thus be  $.3\Delta P$ , where  $\Delta P$  is the increment in the sale price. On the other hand, she must pay the tax of 30%, which, applied to this incremental value, forces her to pay an additional  $.3\Delta P$ . Thus, the benefit from increasing the price above the reservation price is exactly offset by the cost. The seller also wants to ensure that the asset is not taken from her at less than she is willing to accept for it. She thus will set a price exactly equal to her reservation value, ensuring that exactly the buyers willing to pay more than her reservation value will end up taking the asset. Full allocative efficiency is achieved.

What of investment efficiency? Suppose that the asset (which, for the sake of simplicity, let us suppose lasts only this year) is currently worth \$100,000 to her and that by investing \$75,000 she can increase its value to \$200,000 to her, but also increase the value that any potential future buyer will place on it by \$100,000 as well. Because the turnover rate has not changed, our logic above indicates that she will, after the investment, list the property in the cadaster at a value of \$200,000. However, this increases her tax bill by \$30,000. Thus even though the value she gains from the asset whether or not the buyer acquires it has now increased by \$100,000, she is forced to pay \$30,000 of this to the cadaster. It will not be worth it, therefore, for her to make the investment of \$75,000 despite this being in the social interest.

But we can improve investment efficiency by adjusting the Harberger tax. If a lower tax rate were charged, say 10%, then the owner would still be able to capture \$90,000 of the benefit from the investment. This greatly improves her incentive to invest. Of course, if the Harberger tax is reduced below the turnover rate, the owner will charge a price above her reservation value. By increasing the price beginning at her reservation value she could still capture  $.3\Delta P$  of value from a potential buyer, but she would now only be forced to pay  $.1\Delta P$  to the tax authority. She would thus have an incentive to raise the price.

It might be thought that loss in allocative efficiency would offset the gain in investment efficiency but—and this is a key point—the truth is the opposite. When the Harberger tax is reduced incrementally in order to improve investment efficiency, the loss in allocative efficiency is less than

the gain in investment efficiency. The reason is that the most valuable sales are ones where the buyer is willing to pay significantly more than the seller is willing to accept. These transactions are the first ones enabled by a reduction in the price. In fact, it can be shown, using standard economic reasoning, that the size of the social loss from monopoly power grows quadratically in the extent of this power. Thus reducing the mark-up by a third actually eliminates close to  $\frac{5}{9} = \frac{3^2-2^2}{3^2}$  of the allocative harm from private ownership. Furthermore, in this example the distortion to investment is entirely eliminated. More generally, if we considered all scenarios in which an investment could raise the value of the asset to \$100,000, the only investments that would be deterred by a 10% tax are those that cost more than \$90,000 to make. These investments are both rare and not terribly valuable, as the net value they create is small. By the same reasoning as above, it can thus be shown that only roughly one ninth of the total distortion to investment from the 30% tax is caused by a 10% tax. Such a policy achieves five ninths of the allocative benefit of the 30% tax at only one ninth of its cost to investment.<sup>55</sup>

Because of this quadratic structure, it is always optimal to have at least a very small Harberger tax. For example, a 1% tax will hardly distort investment at all but can still significantly improve allocative incentives. The owner will self-assess with reasonable accuracy in order to minimize her tax bill but she will not be deterred from making valuable investments in the property. It is thus typically optimal to set a moderate tax rate, significantly below turnover rate, that balances these two forces. Weyl and Zhang argue that a 5-10% annual rate is likely to be nearly optimal for a wide range of assets, like houses, where investment plays a significant role but allocation can also be seriously distorted.<sup>56</sup>

We call the Harberger tax an element in a system of *partial common ownership* because the people who possess assets are not owners of private property in the traditional sense. The two most important “sticks” in the bundle of rights that compose private property are the “right to use” and the “right to exclude.”<sup>57</sup> In the Harberger system, both of these rights are partly transferred from the possessor to the public at large.

First, take the right to use. Under strict private property, all benefits from use accrue to the owner. Under the Harberger system, on the other hand, a fraction of this use value is revealed and transferred to the public through the tax; the higher the tax, the greater the fraction of use value transferred. Weyl and Zhang calculate that a 5% tax would transfer about half of use value to the

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<sup>55</sup> For details, see Weyl & Zhang, *supra* note \_\_\_, at 7-8.

<sup>56</sup> However, as we discuss below, optimal rates will optimally vary across asset classes. How much and how finely they vary is an interesting design question that trades off complexity with optimality, and we turn to this in the next section.

<sup>57</sup> See Thomas W. Merrill, *Property and the Right to Exclude*, 77 Neb. L. Rev. 730 (1998).

public. Second, consider the right to exclude. In the Harberger system, the “owner” does not enjoy this right vis-à-vis anyone who offers to buy at the self-assessed price. In fact, any member of the public may exclude the current owner in exchange for this price. The lower the price, therefore, the greater is the extent to which the exclusion right is held by the public at large rather than the “owner.” Because the price falls as the tax rises, raising the Harberger tax also shifts the exclusion right to the public at large.

Therefore, we can conceptualize the Harberger system as one in which ownership is shared between the “public” or “society” and the possessor. People are not so much owners of property as “lessees” from society, subject to a special kind of lease that terminates when a higher-value user appears, whereupon the property is automatically transferred to that user. Yet our system is far from centralized planning. The government does not set prices, allocate resources, or assign people jobs: it plays no role, except to mechanically administer a system of property rights. Indeed, as we will argue below, the government’s role would be more limited than it is today because there is no need for discretionary interventions to solve hold out and other monopoly-related problems.

## II. Design and Technology

While the theory underlying the Harberger tax as developed by Weyl and Zhang is simple, putting the theory into practice would face some significant challenges. In this section, we discuss how some of these challenges can be overcome through institutional design and application of advances in information technology.

### A. Rate Structure

Weyl and Zhang show that the optimal Harberger tax depends on two factors: investment and allocation. When the value of property depends on investment that cannot be independently verified by the cadaster, then the Harberger tax should be relatively low. When the monopoly problem is most significant, the Harberger tax should be relatively high—whatever the natural turnover rate for the asset is. The table below summarizes the tradeoffs.

Sensitivity to investment	Monopoly problem	
	High (illiquid assets)	Low (liquid assets)
Low	High tax (approaching natural turnover rate)	Intermediate (5-10%)
High	Intermediate (5-10%)	Low tax (~1%)

These factors differ across assets. In the case of investment efficiency, the value of some assets is more sensitive to investment than the value of other assets. Many everyday objects—books, pieces of furniture, watches, laptops, ball bearings, construction materials—retain their value with very modest maintenance or none at all; many, perhaps most objects, do not increase in value very much if one invests in them, and so people do not bother to. Some goods, like automobiles, are subject to routine maintenance schedules that reduce the rate of depreciation. On the other hand, rare antique cars, gardens, and delicate textiles require constant care to maintain. Holding constant allocative efficiency, the Harberger tax should be lower for the latter goods than for the former.

As for allocative efficiency, we should distinguish goods that frequently turn over in highly liquid markets, such as standard electronic parts, carpentry tools, building materials, and pork bellies. Owners of these goods enjoy (virtually) no monopoly power. No allocative distortion exists in these markets, so a Harberger tax is hardly necessary, though in many cases these commodities also require no upkeep, and thus, it would have little cost. By contrast, rare paintings, antiques, and custom-made clothes hardly trade at all. Automobiles, and commercial and residential real estate fall in the middle. Commercial real estate in a large city, for example, should optimally turn over almost every year, while others, such as family heirlooms, may only turn over optimally once in several generations. In these illiquid markets, Harberger taxes—holding constant investment distortion—should approximate the optimal turnover rate.

This variation suggests that setting the same tax rate across all assets will yield a suboptimal result and Weyl and Zhang prove this is true.<sup>58</sup> While a 7% rate may be roughly optimal if distinctions are not made between property types, substantial welfare gains can be achieved by tailoring taxes more closely to the relevant type of property.

While finer targeting of tax rates improves efficiency, there are some important concerns in targeting tax rates too finely. First and most worrisome is the possibility that the category into which property is placed may be manipulated by owners to minimize their tax liability. Second, excessively fine targeting will reduce the sample size available to measure the turnover rate and thus may lead to biased estimates or, more problematically, may encourage individuals to raise their reported value to depress turnover and thereby lower the tax rate. Finally, excessively fine targeting may make it overly complicated for individuals to keep track of their tax liability or for the cadaster to choose a whole panoply of tax rates.

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<sup>58</sup> See Weyl & Zhang, *supra* note \_\_\_, at 12.

In the near term, therefore, we would advocate a relatively coarse system with a small number of easily distinguishable categories such as real estate, corporate securities, general personal property, keepsakes and heirlooms (which have a low optimal turnover rate and therefore should face a low tax, with some verification to justify placing a good into this category), etc. Such distinctions are commonly made for the purposes of property insurance, and thus it does not seem administratively burdensome to enforce a system of valuation corresponding to these categories. Such a system would obviously be very crude, but in the near term a relatively simple and uniform schedule seems most practical. In the longer term, advances in information technology—including machine learning techniques—may allow for finer gradations.

### **B. Bundling and Quantity Surcharges**

Our discussion so far concerns individual assets owned by a person in isolation. In reality, individuals own many different assets. If the value of an asset to its owner is independent of other assets that the person owns, our analysis is unaffected. However, when assets are complementary with or substitutable for one another to a significant extent, a system that does not account for these relationships will be inefficient.

Two cases, one of substitutes and one of complements, serve to illustrate the problem. First, consider the complements case. Suppose that a person owns three pieces of a triptych. Each component is individually worth a million dollars to her, but if she owns all three, the components are jointly worth \$10m to her. If forced to assign a value separately to each part, she would have to put a value of at least \$9m on each, as this would reflect the value of any component being taken away from her. However, if the owner did this, a potential buyer who values the triptych at \$11 million—more than the owner—would not buy it. The price of \$27 million deters an efficient sale.<sup>59</sup> Moreover, the owner would end up paying a tax reflecting a \$27 million valuation rather than a \$9 million valuation, and so instead she would lower the price. But then someone with lower valuation, say \$5 million, might buy the triptych—again, an inefficient sale. Thus the inability of individuals to express complementarities across goods could seriously undermine the efficacy of a Harberger tax regime.

Now consider the case of substitutes. Suppose that an individual owns both of the two remaining bottles of a rare wine vintage. She is willing to part with either of these two bottles at a price

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<sup>59</sup> The buyer could try to buy the pieces sequentially—the first for \$9 million, then the other two for \$1 million each—but this would leave the buyer exposed to the monopoly power of the current owner, who would know that once the first piece was purchased that she could, with high probability, extract at least \$10 million for the additional two pieces, thus leaving the buyer taking a loss on the whole purchase. A Harberger tax would not much dampen this latter effect, as the owner would know that once the first unit was purchased the buyer would be highly likely, much more likely than the tax rate would reflect, to try for the other two pieces.

of \$10k, but it is important to her to retain at least one of them and she would require \$100k to be willing to give up the second bottle if she has already sold the first. Again inefficiencies will arise if she cannot express this type of valuation. If she is forced to put a value on the two bottles separately, she will be afraid if she puts the price too low that both bottles will be taken (simultaneously). But if she sets a high price, she will again be forced to pay an unfairly high tax and she will discourage an efficient sale of a single bottle to a potential owner.

Fortunately, there are ways to deal with each of these problems. First, consider the problem of complementarity. The seller could list only the entirety of the triptych in the cadaster and include no listing for each of the components separately, at a price near or somewhat above \$10 million. This would ensure that only a purchaser willing to disrupt this full value would purchase it from her. If this purchaser viewed the components as strong substitutes—meaning that she values one just as much as two—she could sell one of the components back to the owner at the low price of \$1m. More broadly, individuals would have the freedom under our regime to package together or apart any property they owned. While individuals would be required to list all of their property in the cadaster in some form if they wanted it protected, they could divide these assets within the cadaster in any way they wanted. Only property that was not covered by some cadastral valuation could be taken “for free”. At one extreme, an individual could list her full estate as a single, indivisible unit and assess a value on it. This would be highly risky if an individual undervalued this estate, however, because a raider could take everything she has and then sell off the components separately. It would also be unprofitable if an individual valued the estate appropriately as it would reduce the individual’s chance to profit on sales of individual items. Weyl and Zhang show that for tax rates below the turnover rate, owners will still assess prices above their personal values and thus will want as many sales as possible to take place.

Thus in practice individuals would choose to only list as bundled together goods that could not be separated except at great loss. This would also give a natural way to deal with goods being combined or repurposed; while a carpenter might start by reporting a pile of wood as her possession, after building a piece of furniture the wood would be dropped from the cadaster and the piece of furniture (combining many pieces of wood) would take its place. This could allow for substantial flexibility along many dimensions.

For the case of substitutes, the problem is less one of packaging than of being able to express non-linear surcharges for purchases of multiple goods. This could be implemented by allowing the individual to list in the cadaster non-additive prices on subsets of goods. In particular, the wine owner we described above could state a value of, say, \$15,000 for the first bottle of the two purchased but a

price of \$120,000 for the purchase of both bottles. The individual would then pay the tax rate on the total value of the two bottles, \$120,000. If the one bottle is sold, the price of the remaining bottle changes to \$105,000 and for the rest of the time the owner possessed that bottle she would be taxed on a basis of \$105,000. While such a system is perhaps a bit more cumbersome than the packaging system, we expect it to be employed less frequently given that strong substitutabilities such as this are less common and even when they occur it is not very frequent that a purchaser would wish to take all units rather than a subset at one time. Nonetheless it should not be too difficult to allow individuals to express such non-linear schedules in cases where they are important.

Obviously, these two cases, of pure complements and pure substitutes, do not represent the set of all possible interactions of values across goods. But for the present, allowing for these basic forms of complementarity and substitutability seems to cover the greatest potential inefficiencies that could occur and those likely to occur most frequently.

### **C. User Interface**

The efficacy of a system like the one we propose here would depend as much on how easily and seamlessly it is presented to users as on the fundamental incentives it embodies. There are two sides to the presentation of our proposed cadaster: how it appears to current owners, and how it appears to potential buyers.

Current owners would have to report values with some frequency for all of their possessions, presenting a tradeoff between convenience and accuracy. If they must report self-assessed valuations frequently, they must undergo the trouble of thinking about how much they value something and of recording the valuation, but if they report infrequently, then valuations will become inaccurate as tastes and budgets change. One approach would be for taxes to accrue in continuous time based on an annualized tax rate, with individuals having the right to change their valuations at any point in time. This system could be managed through a web interface accessible, for example, by a smartphone application or a web browser. A well-designed interface would likely automatically retrieve information from tracking devices of the sort associated with the “Internet of Things,”<sup>60</sup> to help the owner keep track of her possessions. It would be linked to her methods of electronic payment, so that her purchases would automatically be added to the cadaster, at which point she would be asked to assign a value to them. While some individuals would want to carefully weigh each valuation, a sensible system would allow for plug-ins from third parties, that would offer advice to participants about

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<sup>60</sup> See Luigi Atzori, Antonio Iera, and Giacomo Morabito, The Internet of Things: A Survey, 54 *Computer Networks* 2787 (2010).

valuing goods, or default valuations, in an automated way using collaborative filtering and other techniques that form the basis of the ubiquitous recommendation engines. When an owner began to tire of a piece of property, rather than undertaking large expenses to market and sell the property, she could just begin to lower its price on the cadaster, and eventually someone would take the property from her. Indeed, she could use a program that gradually reduced the price until a sale took place, in effect, conducting a Dutch auction, with the rate of reduction reflecting the owner's reservation price, liquidity needs, and the prices of other comparable goods in the market.

Trade-offs would have to be struck between allowing individuals to express a rich range of packaging of goods or substitution patterns and allowing the most common expressions to be made in a seamless and easy way. The details are beyond the scope of this Article, but a topic for future work.

On the potential buyers' side, a well-designed technology offers significant potential for changing the nature of electronic commerce. A few possibilities that a properly-designed system could permit are:

1. A real estate developer interested in purchasing multiple plots of land could draw a shape on a map and be immediately told the aggregate price of the whole region. This could be done for a variety of competing sites for a potential development and the information could even be fed to an optimization engine to find the lowest-cost development site. This could dramatically reduce the transaction costs of property acquisition, and all this could be done without ever tipping off owners to the buyer's interest, as all prices would be posted on the electronic cadaster. The hold-out problem, the bane of developers everywhere,<sup>61</sup> would be solved.
2. A buyer interested in a used car could search the cadaster in a manner similar to how e-commerce sites allow the comparison of a variety of potential purchases from different sellers. Cars would be sorted to make them maximally comparable, both by distance to the buyer and by objective characteristics. One of the worst distortions in our mind from monopoly power is not merely the reduction in turnover, but the time wasted on bargaining.<sup>62</sup> Cars are a leading example of this. In our world, used-car dealerships would shut down, as cars parked on the city streets would effectively

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<sup>61</sup> See, e.g., Lee Anne Fennell, Property and Precaution, 4 J. Tort L. 2 (2011).

<sup>62</sup> Which also produces opportunities for race and sex discrimination. See, e.g., Ian Ayres, Fair Driving: Gender and Race Discrimination in Retail Car Negotiations, 104 Harv. L. Rev. 817 (1991). The Harberger tax, by shielding the identity of the ultimate buyer, would make this type of discrimination impossible.

become a giant, eBay-style dealership that cuts out the middleman and the wasteful bargaining process.

3. A buyer in the proximity of any object could easily determine its value using an IoT connection between the object and the cadaster app on her smartphone, make an electronic payment, and walk away with it.<sup>63</sup> A buyer could also find the prices of comparable items within a reasonable vicinity.
4. Buyers would quickly be able to determine whether an item was missing from the cadaster and thus did not have the protection of the law at any price, allowing such a buyer to take the item for free, or to notify the authorities who would confiscate the property and give the buyer a bounty.

Implementing such an easily-usable system will doubtless come at a cost, in terms of the breadth and flexibility of the system. Allowing expression of maximally rich complementarities and substitution across items might limit the accessibility of user interface or lead to confusion among users. The existing rules of property law appear to reflect such a concern,<sup>64</sup> but they also reflect the level of information technology that existed centuries ago. Given the dramatic advances in the sophistication of electronic commerce in recent years, it seems likely a system with substantial flexibility and usability could be built even at present, and very likely in the future.

#### **D. The Role of Information Technology**

While a Harberger tax system might be viable even with existing technology, it would benefit greatly from technological advances that are already on the horizon. The system we propose is both complementary with and the logical extreme of three of the most prominent trends in digital markets in recent years: the “sharing economy”, the “Internet of Things (IoT)” and “blockchains”. A primary benefit of the sharing economy is that it ensures that all capital assets are fully utilized by their most valuable users at all points in time, rather than laying idle for long periods; the catchphrase of this movement is “unused value is wasted value”.

However, so far most of the innovations in the sharing economy have been directed to reducing the physical and computational costs of moving goods and making matches; they do not alleviate the problems of market power that our proposal addresses. Uber, for example, only partly addresses allocative efficiency problems by allowing people who might otherwise buy cars (after costly bargaining) to rely on rideshares (where they “rent” rides based on publicly available prices in a

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<sup>63</sup> On whether an interval of delay should be built into the system, see Subsection III.C below.

<sup>64</sup> Merrill, *supra* note \_\_\_\_.

reasonably competitive market that includes other rideshare companies, taxis, and public transportation). But Uber drivers have no ability to take underutilized cars from current owners without a long and messy bargaining process. Thus, Uber's progress against the monopoly problem is minimal, and could fall to zero if Uber itself ever obtains a monopoly. To take the step we envision, a firm would have to own all of the relevant vehicles, and charge membership fees to those interested in purchasing them. Only then would the firm be able to capture the benefits associated with reducing the monopoly distortion. Such a firm would effectively have the sort of broad monopoly power that the state possesses and it is dubious whether it is socially desirable for such a system to be implemented privately for this reason. Nonetheless, the Uber experience is valuable in showing the potential impact of information technology: what it has already accomplished for private institutions would be magnified many times if legal institutions took advantage of these technological innovations as well.

Similarly, the movement in IoT to connect the vast majority of property to the internet is tightly aligned with our objectives. While so far this movement has had a limited impact on the marketplace, implementing our system would both accelerate the progress of IoT and be greatly supported by the development of IoT technologies. Individuals would have an incentive to connect their property to the IoT to gain help with valuing goods. For example, individuals might prefer not to attach a valuation to their refrigerator; if the refrigerator were connected to the IoT, an automated system could explore the prices of similar local refrigerators and spit out a default valuation that the owner could adjust or leave alone. IoT technologies would also, as we discuss below, make it easier to monitor tax deductions for investments and recommend potential investments to participants. And allowing automated cataloging of the state of physical objects would play a similar role in helping to determine the appropriate deductions to be given for investment in assets like real estate.

Finally, our proposal fits neatly with the increasing popularity of "smart contracts" on blockchains that offer a mode of governance that is self-enforcing and decentralized. In these systems, most famously epitomized by the recent community "Ethereum,"<sup>65</sup> contracts are written into the code of a collectively monitored transaction system whose operations are coordinated by the unanimous consent of the participants' computers. The goal is to avoid allowing discretionary power that is potentially subject to abuse to lie with any central authority. Because our proposal operates through simple rules that could be administered in an automated way, with taxes that are collected being automatically redistributed in a pre-specified manner to participants, it opens perhaps for the first time

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<sup>65</sup> See Ethereum, Wikipedia, <https://en.wikipedia.org/wiki/Ethereum> (visited August 1, 2016).

the possibility of truly decentralized “common ownership” that does not require any discretionary state authority to administer. It is because of this possibility that we anthropomorphized the “cadaster” itself throughout this paper; it may in the not too distant future be possible to administer a system like that the one we describe with very little centralized human oversight. Of course, this is not the only or even necessarily the best form of administration and recent work on such systems has been full of bugs.<sup>66</sup> But, as with the other technological trends we highlight, there is a natural complementarity between our proposal and these developments in computation.

This all suggests that an important reason why Harberger taxation has not been used in the past is that without modern information technologies it would have been challenging to implement, would have required relatively low tax rates, and would have generated quite limited welfare gains. Conversely, we believe its benefits will grow in coming years. Our framework provides a way to understand and predict the co-evolution of market technologies (produced by the private sector) and property rights (produced by the government).

It is important to note, however, that a crucial implicit assumption we have employed here is that while technology will increasingly allow the government to monitor the physical state of assets and help individuals to sort and search through assets, it will not directly allow centralized authorities to observe individuals’ private preferences without their consent. If it did allow this, then the central planning envisioned by Lange, Lerner, and Taylor would become more desirable than the sorts of decentralized market solutions we advocate.<sup>67</sup> We do not think that information technology will achieve such “mind-reading” capacity in the foreseeable future.

### **E. Encumbrances**

Property can be encumbered with various interests. Real estate, for example, is frequently encumbered with mortgages, leases, easements, covenants, and the like. Personal property can also be encumbered, by being pledged as collateral, as with an auto loan. Such encumbrances would continue to exist in the Harberger system—although some of them, including mortgages and leaseholds, might become less common because they are necessitated by high asset prices in the first place. Although it might seem that encumbrances would create complications for the Harberger tax,<sup>68</sup> in fact they can be easily accommodated.

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<sup>66</sup> The Economist, Not-so-clever Contracts, July 30, 2016.

<sup>67</sup> See Subsection IV.A below; see generally Oskar Lange, The Computer and the Market, in *Socialism, Capitalism and Economic Growth: Essays Presented to Maurice Dobb* 158-61 (C.H. Feinstein ed., 1967).

<sup>68</sup> See Holland & Vaughn, *supra* note \_\_.

In the Harberger regime, when a person buys property that is encumbered, she takes the property subject to any encumbrances, which would continue to be “owned” by the encumbrance owners. The owner of an office building self-assesses the value of the building subject to the leases—which could enhance the value of the building because they have favorable terms or suppress the value of the building because the terms are unfavorable. The buyer of the building takes the building subject to the leases, just as a buyer of an office building does under our current system. But unlike the current system, the buyer in the Harberger system could also buy out the tenants at *their* self-assessed values (for their leases), avoiding the complex negotiations currently necessary to buy out tenants, or the need to wait them out.

Similarly, if a person buys a watch that has been pawned, she must redeem the watch from the pawnshop by paying the debt. This means that the pledge of the watch must be recorded on the cadaster, so that people are aware of third-party interests when they buy property—just as some encumbrances on real estate are currently recorded.

### **III. Some Practical Challenges**

Beyond the broad questions of design, there are a number of specific practical objections to our proposal that need to be addressed before it could achieve support. While many of these issues would need to be worked out in greater detail over time and with experience, in this section we provide a sketch of how we imagine confronting these challenges and why we do not view them as likely to outweigh the benefits of Harberger taxation.<sup>69</sup>

#### **A. Transitional Issues**

One possible objection to Harberger taxation is that applying it to *existing* assets could involve large-scale redistribution of wealth. A 5-10% annual tax on the stock capital value of an asset would reduce the value of privately held capital by 50-75%, depending on market interest rates, because the expected future tax payments would be capitalized into the assets’ values. The owners of capital assets—the wealthy and powerful, as well as anyone else who owns property—would hardly be happy with such a tax. And such a transfer of value from people who worked hard to earn money that they

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<sup>69</sup> We do not address all issues; it is worth flagging here one: the treatment of moveable property if their current possessors seek to emigrate them or sell them to foreigners living in foreign countries. At one level, the problem is akin to a person who rents a car in the United States, drives it to Canada, and attempts to sell it. This is illegal. But a more sophisticated response would be to require people who seek to move property overseas into an ordinary private-property regime to pay the state for its share of the property, effectively in the form of a tax, which would be roughly equal to the expected discounted value of all the taxes the person would have been expected to pay over the useful life of the property if it had remained in the country.

used to buy houses, cars, and treasured items might be regarded as unfair. Hence the Harberger tax is dead on arrival.

This objection is seriously defective. The Harberger tax creates far more wealth than it depletes, and much of this wealth will flow to the apparent losers. While a homeowner's house will lose value, that person will save enormous money on lower prices when she buys a home in the future or rents an apartment. But the more important response is that the way that the gains from Harberger taxation are distributed is, itself, a political question. The public, acting through the government, can choose to compensate people who, on net, lose from Harberger taxation. Indeed, Harberger taxation does not pose any unique transitional issues; any new tax—including a conventional tax on real estate, for example—creates winners and losers. If the transitional shock is too great, the tax can be introduced in stages—starting with administrative property rights that are newly created and hence do not redistribute existing wealth—and, as we said, with some degree of compensation.

Another worry is that a new tax like the Harberger tax would unsettle the public's expectations about the government's propensity to tax, leading to distortions in their behavior. Although one of the older doctrines in economic thought is that a one-time capital levy does not distort investment behavior because people do not anticipate it, a tax today can create expectations of additional taxes in the future,<sup>70</sup> and damage the reputation of the government that enacts them, causing lasting damage to economic institutions.<sup>71</sup> However, it is widely believed that if a capital tax is imposed for a clear *efficiency* purpose, rather than redistributive purpose, the chance of its continuing to increase is greatly reduced, because there is no reason its optimal rate will rise over time.<sup>72</sup> The losses to private individuals from the Harberger tax, given that these losses follow from an efficiency rationale, are not basically different from losses on capital resulting from technological progress or any other largescale change in government policy, including ordinary tax and regulatory changes. It is thus not clear that there would be any great harm created by the imposition of Harberger taxes on existing assets, even

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<sup>70</sup> See, e.g., Barry Eichengreen, *The Capital Levy in Theory and Practice* (Nat'l Bureau of Econ. Res., Working Paper No. 3096, 1989).

<sup>71</sup> See, e.g., Torsten Persson & Guido Tabellini, *Representative Democracy and Capital Taxation*, 55 *J. Pub. Econ.* 53 (1994).

<sup>72</sup> Actually, given our discussion in Subsection II.A above, it may be that the optimal rate will rise over time, but only as the ability to provide deductions for investments improves. Because such deductions would compensate for the increased rates they should not, on average, discourage investment.

if it involved substantial redistribution.<sup>73</sup> We now turn to whether this redistribution would be desirable.

## **B. Liquidity and Fairness**

Some people may, after holding property for an extended period of time, develop special attachments to it<sup>74</sup> and yet not have sufficient liquid assets to pay the taxes to preserve it from being taken from them. This concern parallels controversies over eminent domain procedures where an elderly resident, for example, is forced to move out of a house that has been owned by her family for generations, in order to make way for an apartment block or casino.<sup>75</sup> Any system that weakens people's bonds to personal property might be regarded as unacceptable.

We have four reactions to this objection. First, we do not believe that such attachments are very common, and, more important, we suspect that such attachments will become less common in a world in which most property is not "owned" in the traditional sense. Many people love their cars, but fewer such attachments come into existence when more and more people rely on Uber, Lyft, Zipcar, and public transportation, and this process would be accelerated under Harberger taxation, where a kind of Zipcar model would become the norm rather than exception. People can be train enthusiasts without owning trains.<sup>76</sup>

Second, our system would reduce the role of liquidity and resource constraints in stopping individuals from owning property that is valuable to them. Under the present regime, individuals unable to borrow the funds to own a house (or other large property purchase) are forced to rent. Under our system the prices of assets would be only a quarter to a half of their current level. This would force individuals to raise a far smaller quantity of cash in order to gain ownership, albeit a more limited form of it. Such reductions in housing as an illiquid and lumpy store of wealth might have other benefits, such as limiting the possibility of bubbles, allowing people to move more easily to job opportunities, reducing neighborhood blight, and reducing the financial risk individuals face from fluctuations in housing prices. Furthermore, the dramatic reduction in the price of assets would make the taxes necessary to maintain ownership much more manageable, even for relatively liquidity-

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<sup>73</sup> Obviously, provisions would have to be made to avoid capital flight in anticipation of the levy, as with any capital levy, though the application of the tax over time and thus the capitalization of the tax into asset prices rather than a one-time expropriation would largely mitigate this concern.

<sup>74</sup> See Margaret Jane Radin, Property and Personhood, 34 Stan. L. Rev. 957 (1982).

<sup>75</sup> See Timothy B. Lee, Donald Trump Really Did Try to Take an Elderly Widow's House for a Limousine Parking Lot, Vox (Feb. 7, 2016), <http://www.vox.com/2016/2/7/10931176/donald-trump-eminent-domain>.

<sup>76</sup> The idea that people are excessively attached to material possessions has long been a theme of religious leaders and social reformers.

constrained (partial) owners. For example, if a tax of 10% reduced asset values by two thirds, the tax would be 10% of one third of the original value. In other words, the fraction of current values the owner would pay each year would only be a little more than 3%. This is higher, but not dramatically higher, than current property taxes, which already may have the effects of driving illiquid owners out of their homes (since the wealth they could otherwise use to pay property taxes are locked up in their houses).

Third, people could gain the liquidity to make tax payments through insurance schemes offered by private firms. The insurance would cover the tax payments in exchange for a share of the gains if the house were sold at the going price. This could reduce the illiquidity of individuals who own valuable property but wish not to sell it with a high probability. Of course, this would only work if they accepted some chance of selling their home, but would overcome many of the pure liquidity issues.

Finally, a more comprehensive system of insurance against, for example, changing local house prices, could address most of the concerns that changes in asset market prices could force an individual out of their home. Obviously, the same concerns would apply to renters under the present system, and yet in practice this rarely occurs. Most renters do not purchase, if they even have access to, insurance products protecting them against rises in their rent. Our system might effectively make “renting” more common (though it might also allow some renters to move into partial ownership) and would thus be complementary to improvements in the quality of insurance for renters against price changes, such as investments in real estate, or derivatives such as those proposed by Robert Shiller.<sup>77</sup>

### **C. Disruption and Planning**

Another concern is that many assets are costly to transfer infrequently and at unexpected times. Moving is costly, so leases on real property usually have terms of at least one year. It may not be desirable for individuals to be forced to move immediately and unexpectedly out of a property they own. This is why, for example, even eviction proceedings are complex and may take an extended period of time. Suddenly losing one’s car, personal computer, or desk chair would also be disruptive. Such concerns, however, could be dealt with in a natural way through small changes to the administration of Harberger taxes. One simple change, inspired by the way evictions are treated in

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<sup>77</sup> Robert J. Shiller, *Macro Markets: Creating Institutions for Managing Society’s Largest Economic Risks* (1993).

current law, would be to give a period of a few months for a current owner to move out of real property or surrender a piece of personal property to a new owner.

A somewhat more significant but still modest change would be to allow owners to declare intervals up to some reasonable limit (say a year or two) during which they wish to maintain ownership. Upon declaring such an interval, the individual would have to declare a value and allow potential purchasers a “last chance” to claim the good before such an interval began. Then, during that interval, the individual would only be allowed to adjust the price (and thus the tax paid) on the asset upward, until the end of the interval. After the end of the interval, downward adjustment would be allowed, along with the opportunity to purchase the good. Additionally, any prospective future owner would have the right to claim the property at the current price at any time during this interval. If such a claim were made, however, the property would not be surrendered until the end of the interval. The current owner would have to continue paying taxes on the property at the purchase price until surrender occurred, at the end of the interval or at an earlier time if the owner felt unexpectedly that she could surrender it earlier. In any case, the owner would be legally prohibited from receiving any consideration for early sale from the prospective buyer, as that would allow her to exercise monopoly power over the right of delay. Some adjustments might have to be made for the time value of money, but we abstract from these for the moment.

Such an adjustment would eliminate the most severe harms associated with “interruptions” in ownership at a relatively limited cost in terms of making assets more illiquid. Furthermore, owners would not have an incentive to declare such illiquid periods unless interruption were really costly to them, as such periods would raise their tax burden by making downward price revisions impossible for a time. The ability to lock in a purchase price for a buyer at any time would maintain most of the benefits of avoiding holdout problems and the prohibition on consideration for early sale would avoid most of the costs of exploiting this rule strategically to exercise monopoly power over potential purchasers.<sup>78</sup>

#### **D. Inspections and Transfers**

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<sup>78</sup> Some readers have suggested that under the Harberger tax system, rich people could torment less wealthy enemies by forcing purchases of property from them to which they have sentimental attachments, like jewelry. However, if the Harberger tax system is applied to such items, then the tax will be very low because the optimal turnover rate is low, which means that the owner can protect the property by paying a very low tax, and should feel full compensated if the property is taken, in which case the wealthy person can no more harm her by taking the property than by offering to buy property at the seller’s price in the current system. Moreover, it should be kept in mind that similar problems arise under our current system—for example, the spite fence problem—and tort and related doctrines have been developed to address them. The law may need to address these challenges as they arise in a pragmatic fashion but there is no reason that the Harberger system would lend itself to gaming and abuse more than our current system does.

A final issue is that before purchasing an asset, many potential buyers will want to inspect it to ensure its quality and fit to their preferences. During such an inspection process it would clearly be problematic to allow the owner to revise her price in anticipation of an increased chance of being able to exert monopoly power. A reasonable solution would be for prospective buyers to be allowed to freeze the price of a potential purchase in order to investigate it in exchange for the payment of a small fraction of the asset's quoted value (say 1%) being made as an irrevocable payment, with this payment being refundable if some clear misrepresentation about the value of the asset were discovered during this process. This hold would persist for a reasonable period of time necessary for the inspection, and then would lapse. Because the exact percentage that is reasonable and the length of time for a hold that is reasonable depend on the particular asset in question we leave precise settings of these parameters for future research and empirical experience.

#### **F. Investment Subsidies**

Weyl and Zhang estimate an optimal Harberger taxation rate of 5-10% based on the assumption that a higher rate—one that maximized allocative efficiency—would create excessive distortion in investment incentives. However, a high taxation rate would be viable if the government could independently subsidize investment. Such an approach, if viable, would enhance both allocative and investment efficiency.

To see how such a system could work, suppose that improvements or depreciation to property can be at least approximately observed by the cadaster, and their value to potential purchasers assessed. Property owners would be allowed to deduct that amount (on a refundable basis) from the Harberger tax owed on a property. Because this subsidy replaces the reduction in investment value created by the tax, the system as a whole creates no disincentive for investments.<sup>79</sup> A natural approach would be to implement this credit according to a depreciation schedule based on when the value created is expected to accrue, with the interpretation that the credits would be inherited by any future purchaser of the asset and thus incorporated into the asset value. However, at present, surveys to determine investment are conducted infrequently, making an up-to-date assessment difficult to conduct and thus objective assessments noisy. Therefore, at present it would likely be necessary to rely, as with investment tax credits, on a combination of random audits with self-reported investments. Such a system might create significant opportunities for gaming and noise, making investment incentives far from perfect and thus continuing to make relatively low Harberger tax rates optimal.

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<sup>79</sup>Weyl & Zhang, *supra* note \_\_\_, at 25 n.11.

However, we speculate that advances in technology will ameliorate these problems. Nikhil Naik, in collaboration with a variety of colleagues, has developed methods for using Google's Street View images to produce high quality, low cost, high through-put and frequent assessments of real property values for tax purposes.<sup>80</sup> While these methods are obviously imperfect, even for real property (there may be ways to make real property look good from the outside, while maintaining internal flaws, or to trick the relevant algorithms), they seem a promising basis for making objectively-assessed property subsidies that are precise enough to offset the investment deterrents of common ownership.

While this method applies only to real property, improvements in the technology of the so-called "Internet of Things" (IoT) seem likely to make analogous methods practicable for a wide-range of property. The goal of the IoT agenda is to allow a wide range of physical objects to be closely monitored and supervised digitally. For example, many vehicles are already monitored by electronic systems, which record distance driven, the quality of driving, and maintenance.<sup>81</sup> It seems likely that in many years, quite accurate evaluations of capital investments, perhaps even more accurate than those carried out by a human potential purchaser, will be available electronically, and thus could be employed by the cadaster.

To see how this approach might work in the context of real estate, imagine that new houses of a certain type and in a certain location require \$4,000 of maintenance per year, on average. The current owner of a house would notify the cadaster whenever the plumber or electrician did maintenance work by emailing the bills to it. The cadaster would verify the claims electronically, relying on sensors in the house that are connected to the internet. It would then determine the amount by which this maintenance increased the value of the house relative to what it would otherwise have been; say \$10,000. Every year the individual would receive a \$10,000 refundable deduction against her taxes. If the tax rate were 10% and the assessed value of her house were \$150,000, her tax would be reduced from \$15,000 to \$14,000. This is an example for standard maintenance but a similar approach could be taken for remodeling. If an algorithmic analysis of visual images concluded that the value of the

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<sup>80</sup> This work has not yet been published, but for discussions of two other applications of the same techniques, see Nikhil Naik, Jade Philipoom, Ramesh Raskar, & Cesar Hidalgo, Streetscore: Predicting the Perceived Safety of One Million Streetscapes IEE Conference on Computer Vision and Pattern Recognition Workshops 793 (2014); and Nikhil Naik, Scott Duke Kominers, Ramesh Raskar, Edward L. Glaeser, & Cesar A. Hidalgo, Do People Shape Cities, or Do Cities Shape People? The Co-evolution of Physical, Social, and Economic Change in Five Major U.S. Cities (Nat'l Bureau of Econ. Res., Working Paper No. 21620, 2015).

<sup>81</sup> These systems are already used by insurance companies and employers. See Ron Lieber, Lower Your Car Insurance Bill, at the Cost of Some Privacy, N.Y. Times, August 15, 2014.

house had been increased, in a renovation, by \$40,000 per annum for the next 10 years then in each of these years the house would carry with it a \$40,000 refundable deduction against the Harberger taxes owed; at a 10% tax rate this would be worth \$4,000 per year.

These observations illustrate on an old but important idea: the optimal form of property rights depends on the technologies that are available to measure, manage, and record the things that people value.<sup>82</sup> We speculate that as technologies improve for monitoring investments, there will be a wholesale shift from private property to partial common ownership.

## **IV. Applications**

We begin by discussing the application of our approach in more limited domains where the practical challenges we raised in Section III are relatively modest. These areas are the most promising domains for applying our approach in the short term, but also are somewhat narrow, and thus offer a more limited upside. We then turn to corporate acquisitions and traditional property transactions, where our approach will be more controversial, but also offers the greatest potential social benefit.

### **A. Administrative Property**

#### 1. Spectrum

Economists have had more influence over the design and allocation of property entitlements to electromagnetic spectrum than over any other kind of property. While spectrum was initially allocated to users on a first-come-first-serve basis aimed at simply allowing the maximum number of broadcasters to use the spectrum, by the late 1920s the Federal Communications Commission began allocating the spectrum based on “public interest” hearings.<sup>83</sup> In 1951, inspired by the same work of Abba Lerner that inspired Vickrey’s interest in auctions, Leo Barzel proposed auctioning use rights while retaining public ownership to ensure competition in these auctions.<sup>84</sup> Ronald Coase in 1959 first proposed the ideas that came to be known as the “Coase theorem” as a justification for full privatization of the spectrum based on a one-time auction.<sup>85</sup> After years of discussion and a cumbersome experiment with allocating cellular telephony spectrum by lottery during the 1980s, the first spectrum auctions were organized in the 1990s.

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<sup>82</sup> See, e.g., Henry E. Smith, Property as the Law of Things, 125 Harv. L. Rev. 1691 (2012).

<sup>83</sup> Our historical narrative here derives from Thomas W. Hazlett, Assigning Property Rights to Radio Spectrum Users: Why Did FCC License Auctions Take 67 Years?, 41 J.L. & Econ. 529 (1998).

<sup>84</sup> Leo Herzel, Public Interest and the Market in Color Television Regulation, 18 U. Chi. L. Rev. 802 (1951).

<sup>85</sup> R. H. Coase, The Federal Communications Commission, 2 J.L. & Econ. 1 (1959).

Because these auctions involved selling off a large collection of diverse rights that might be complementary or substitutable with each other, the design of the auction proved a long and complex process.<sup>86</sup> The eventual format settled on, after detailed consultation with many leading microeconomists, involved simultaneous English (ascending price) auctions on all lots. This design was widely copied around the world and was viewed as reasonably successful, but left two important issues open that became the focus of changes to design and policy making in the decades since.

First, the simultaneous ascending auction can be a problematic format for participants who view different licenses as complementary with one another, such as a cellular carrier trying to establish a national footprint. A participant bidding on a subset of licenses does not know, until she is already stuck buying some of the licenses, what the prices on the other licenses she is pursuing will be. This “exposure” problem stimulated the development of new auctions that allow bidders to express preferences for collections of licenses rather than just individual licenses.<sup>87</sup> However, these auctions have turned out to have their own deficiencies related to potential collusion and predation that make them of questionable practical utility.<sup>88</sup> Thus, at present there is both disagreement about the best available format for auctioning these licenses, and a concern that no satisfactory format is currently available. These concerns are acute because, as one of the most influential designers of these auctions, Paul Milgrom, has argued, private property rights over spectrum make the reallocation of spectrum inefficient and thus make the efficiency of an initial allocation crucial.<sup>89</sup>

In fact, the second major concern with spectrum policy relates directly to the difficulty of reallocation after an initial assignment. Because of the rapid advance of wireless technologies, new possibilities for using spectrum to supply high-speed and broadly available internet connections have opened up in the two decades since the initial auctions. However, the monopoly power of current license holders—both auction winners and especially those allocated licenses under the older system—has impeded implementation of these new technologies.<sup>90</sup> This problem has been exacerbated by the fact that many of these new uses require assembling many complementary current licenses to form large contiguous blocks, creating opportunities for holdout by current license owners.<sup>91</sup>

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<sup>86</sup> Milgrom, *Putting Auction Theory to Work*, *supra* note \_\_\_\_.

<sup>87</sup> Lawrence M. Ausubel & Paul Milgrom, *Ascending Auctions with Package Bidding*, 1 *Frontiers Theoretical Econ.* 1 (2002); Lawrence M. Ausubel, *An Efficient Ascending-Bid Auction for Multiple Objects*, 94 *Am. Econ. Rev.* 1452 (2004).

<sup>88</sup> Jonathan Levin & Andrzej Skrzypacz, *Are Dynamic Vickrey Auctions Practical? Properties of the Combinatorial Clock Auction* (Nat'l Bureau of Econ. Res., Working Paper No. 20487, 2014).

<sup>89</sup> Milgrom, *supra* note \_\_\_\_.

<sup>90</sup> Eisenach, *supra* note \_\_\_\_.

<sup>91</sup> Kominers & Weyl, *supra* note \_\_\_\_.

As a result, in 2012, Congress authorized a plan allowing the FCC to buy back spectrum and “repack” the rights of those who refuse to sell to maximize the contiguous spectrum available. The “reverse auction” to buy back these rights is underway as of this writing.<sup>92</sup> However, nearly a decade elapsed from the time that spectrum reallocation was recognized as clearly necessary to the present. Such delays are widely seen as having placed the United States behind nations such as Israel, where the next generation of wireless internet has been widely available for years. These delays have led to political pressure from a variety of industry groups, such as the Dynamic Spectrum Alliance, calling for broader reform of the system of spectrum allocation to ensure that future innovation is not held back by monopoly power and the bureaucratic process of organizing a centralized auction.

Furthermore, given that the current auction system still entitles owners to refuse to sell their licenses, it does not eliminate all opportunities for socially costly holdout. Empirical analysis by Ulrich Doraszelski and his co-authors suggests that recent maneuvers by private equity firms to buy up large numbers of licenses to raise prices in the auction may substantially reduce the revenue raised by the government and spectrum successfully reallocated because of the monopoly power it will convey.<sup>93</sup>

Replacing the current licensing regime with a Harberger tax regime could address many of these concerns. Once Congress put the Harberger tax regime in place, the tax would create a liquid and far less distorted market for reallocating licenses across users without requiring major additional legislative or administrative actions like those underlying the latest auctions. This would create flexibility for continuous dynamic reallocation, permitting continual innovation in uses and the turnover of property to new technology firms.

Moreover, the Harberger tax system would address many of the problems mentioned above. First, the ability to flexibly reallocate spectrum over time would dramatically reduce the harms associated with an imperfect initial auction allocation, alleviating many of the concerns about the format mentioned above. Second, the continual availability of prices on all licenses would reduce the magnitude of potential exposure and holdout problems. Finally, a major challenge in the current spectrum reallocation has been how to implement new uses, while staying within the interference constraints, which exist to ensure that existing users can continue to use the spectrums they own. If rights could be more flexibly decoupled, marketed and reallocated using methods like those we described in Subsection II.C above, it seems likely that private sector innovations in satisfying these

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<sup>92</sup> Milgrom & Segal, *supra* note \_\_\_\_.

<sup>93</sup> Ulrich Doraszelski, Katja Seim, Michael Sinkinson, & Peichun Wang, *Ownership Concentration and Strategic Supply Reduction* (Ctr. for Econ. and Pol’y Res., Discussion Paper No. DP11173, 2016).

constraints could be allowed to improve the allocation well beyond what has been possible through the central direction of the FCC. In turn, the FCC could simply enforce the interference rules; collect the taxes to fund its other activities and return the excess to the treasury (as it does with auctions); and administer a central computerized cadaster of current license holdings.

Furthermore, a number of factors make the implementation of Harberger taxation in this setting seem reasonably possible. Perhaps most important, the FCC has consistently shown itself open to the use of innovative ideas from economic theory in the design of spectrum licenses and their auctioning. Additionally, some licenses, especially in rural areas and to channels previously used for military purposes, remain unassigned, and thus could be placed under a new licensing regime if they are eventually auctioned with minimal disruption to existing entitlements. Such relatively limited settings could offer an opportunity for experimentation with new and improved property regimes.

However, even this relatively clean application of the Harberger tax regime faces some practical design challenges. Most important is that it would require a substantial political conflict to force existing license holders, who paid large sums in previous auctions or were grandfathered in under previous systems, to submit to high levels of Harberger taxation that would expropriate those investments. In expanding Harberger taxation beyond new licenses to existing entitlements, some of the concerns we discussed in Subsection III.A would arise and some of the solutions we suggested there would have to be deployed.

Another important concern is the treatment of investments that are complementary with broadcasting on a particular channel. Such investments (broadcasting and tuning equipment, studios for producing programming, etc.) are imperfectly portable across owners of a license and stations from which that owner operates. The natural way to handle this would be to subject all equipment and other complementary investments to Harberger taxation, but allow owners to determine, as in Subsection III.C, whether to connect or separate these goods. In cases such as equipment tightly coupled to the station, it would likely make sense for a license holder to tie the equipment to the station, as this equipment would be mostly valueless to her if her channel were taken. On the other hand, the broadcast studios and investments in content production are highly tied to the owner and are largely portable across channels; in fact, in the current spectrum reallocation, many television stations are being moved across channels at apparently quite limited cost to the broadcasters. Such investments, however, would be of limited value to a new owner, and thus it would typically be optimal to decouple these from the station. The rates of taxation applied to each of these assets would likely

also be different, given that the optimal turnover rate of the channel and broadcast equipment is likely greater than that of assets related to content production.

Furthermore, given the broad regulatory powers the FCC has over broadcasting, it is plausible that it already has the authority to impose taxes on broadcast equipment and content production facilities, though this merits further study. However, even if the FCC lacks this authority at present, it would not be difficult for the FCC to determine the investments that would be subject to this tax. Equipment used directly in broadcasting is highly specialized and can be distinguished easily from other property. Content production facilities and employment relationships may be a bit more nebulous. For example, some content production facilities produce programming for both traditional broadcast and for internet streaming—should those facilities be taxable by the FCC as part of “broadcasting”? In practice, however, these ambiguities are minor. Most local broadcasters primarily reach audiences via broadcast; a threshold could be set for exemption from the tax for facilities that produce content that overwhelmingly reaches consumers over the internet. Furthermore, content production is sufficiently unlikely to be tightly complementary with a particular channel, meaning that exempting content production from the tax would likely cause, at most, a very limited loss of efficiency. This separation of content facilities from broadcast equipment is already implemented in the current regime of spectrum repacking, and thus would not pose substantial administrative concerns, beyond those already appearing at present. Spectrum thus seems a promising first experiment in the use of Harberger taxation with universal compulsory purchase provisions.

## 2. Assigned names and numbers

Internet domain names enable Web users to locate a desired website by typing in an easily remembered string of text into the address bar of their browser. The domain name for Google, for example, is simply [www.google.com](http://www.google.com). Businesses like Google place a great deal of value on possessing domain names that are identical to or similar to the name of the business, brand, or product. So do governmental units, private organizations, and ordinary individuals.<sup>94</sup>

To obtain a domain name, a person or business applies through various registries. The Internet Corporation for Assigned Names and Numbers administers the domain name system. The system as a whole distributes names on a first-come, first-served basis. If Posner applies for [glenweyl.com](http://glenweyl.com) before Weyl does, then Posner “owns” the [glenweyl.com](http://glenweyl.com) domain name. If Weyl wants the domain name badly enough, he must buy it from Posner like any other property.

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<sup>94</sup> See [ericposner.com](http://ericposner.com) (last visited July 29, 2016); [glenweyl.com](http://glenweyl.com) (last visited July 29, 2016).

In the early days of the Internet, this system gave rise to the problem of “cybersquatting.”<sup>95</sup> Many corporations were slow to realize the importance of domain names, allowing entrepreneurial individuals to snatch the corresponding domain names before the corporations applied for them and then offer to sell the names to the corporations for an exorbitant price. For example, a fellow named Dennis Toeppen registered the Panavision.com domain name and then offered to sell it to Panavision for \$13,000. Toeppen did not have any business interest in the Panavision name other than the desire to extract money from the company. Cybersquatting is a straightforward example of the type of allocative inefficiency that can arise in a regime of private property. If people like Toeppen can seize domain names and then hold out against the companies and persons who value them the most, then—as a result of bargaining failure—some portion of domain names will not be allocated to their highest-value users. The courts halted cybersquatting through an aggressive (and possibly dubious) interpretation of trademark law, which was subsequently ratified by legislation.<sup>96</sup>

However, cybersquatting is only the most extreme form of behavior that causes allocative inefficiency for domain names. Courts can stop it because the squatter cannot show that the domain name has any intrinsic value to him or her, while it is obvious that a major corporation places a high value on an eponymous domain name. The law has not been able to address other kinds of problems. Consider, for example, the conflict between Delta Airlines, Delta Financial, and DeltaComm Internet Services over the delta.com domain name.<sup>97</sup> The delta.com name was initially acquired in 1993 by DeltaComm Internet Services, apparently for legitimate business reasons—delta is a shortened version of its name. However, DeltaComm was clearly not the highest-value user of the name; indeed, the company’s website attracted bewildered customers seeking airline tickets. But DeltaComm and Delta could not agree on a price, and DeltaComm sold the domain name to Delta Financial. Delta sued Delta Financial, and eventually the two companies settled, with the domain name ending up in Delta’s hands where it belonged. Fans of the Coase Theorem might reflect on the fact that this simple transaction involving two entities took *four years*, and no doubt cost millions of dollars in legal fees.<sup>98</sup>

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<sup>95</sup> See, e.g., Jacqueline D. Lipton, Beyond Cybersquatting: Taking Domain Name Disputes Past Trademark Policy, 40 Wake Forest L. Rev. 1361 (2005).

<sup>96</sup> See Panavision I, 938 F. Supp. 616 (C.D. Cal. 1996), aff’d 141 F.3d 1316 (9th Cir. 1998); Anticybersquatting Consumer Protection Act of 1999, 15 U.S.C. § 1125(d). The legal developments are described in Lipton, supra note \_\_, at 1369-81.

<sup>97</sup> As discussed by Lipton, supra note \_\_, at 1406-07, citing Christopher Elliot, No Winner in Delta.com Deal, Inside Interactive Travel, Sept. 5, 2000.

<sup>98</sup> Elliot, supra note \_\_. For a discussion of the limits of Coasean logic, as applied to domain names, see Anupam Chander, The New, New Property, 81 Tex. L. Rev. 715, 781-91 (2003).

The existing legal regime cannot resolve this problem because all three companies had a legitimate business interest in the delta.com domain name. The only question from a policy perspective was which company valued the name most. To resolve this question in a court, it would be necessary for the judge to determine which company valued the domain name the most. But, as we have explained, the premise of the system of private property is that government officials, like judges are not equipped to make such valuations except in extreme cases exemplified by cybersquatting where it is obvious that one party attaches no value to the property except for its hold-out potential.

The Harberger tax offers a simple and elegant solution to this problem. When DeltaComm initially registered for the domain name, it would have been required to state its valuation to the registry (or, in our system, the cadaster). The Harberger tax gives the domain name owner an incentive not to overstate its valuation. Once Delta had realized the value of the domain name, it would have paid Deltacomm a price equal to Deltacomm's valuation and obtained the domain name. The transaction would have taken a minute rather than four years.

The domain name presents a clear case for the Harberger system because it is unlikely that another company that values delta.com more than Delta does would value the domain name in a way connected to the value of the Delta brand. This means that Delta can invest in publicizing its domain name without much fear that it will lose its investment to a third party. Indeed, DeltaComm's experience shows that a buyer might well be harmed by Delta's investment—bombarded, like DeltaComm by inquiries from people who want to buy airline tickets—unless the buyer was another airline that bought Delta and fully internalized Delta's investments in its brand. Obviously bargaining problems could still arise in such a setting, because Delta's other assets would not be covered by the Harberger tax, which is why we advocate extending it to corporate shares, as we now discuss.

## **B. Corporate Acquisitions**

The system of self-assessed taxation could be extended in many directions. An obvious application is to corporate acquisition. When one corporation (or person or group of people) seeks to take over another corporation, a messy battle frequently ensues. The acquiring corporation must propose a price that is high enough to satisfy the directors and shareholders of the target corporation. The directors and shareholders—the sellers—have strong incentives to hold out for a price that is greater than value of the target corporation standing alone, and this problem is exacerbated by the collective action problem among shareholders, and the conflicts of interest between shareholders,

managers, directors, and other stakeholders.<sup>99</sup> The current solution is a messy system of bargaining and voting against the background of judicial appraisal remedies. The irony of this system is that the judicial backstop assumes that a government official—the judge—can make a valuation when the market system is premised on the assumption that the government is incapable of determining values. It is common wisdom that judicial appraisals are questionable or even arbitrary.<sup>100</sup>

Now consider an alternative system. Each stockholder would have to disclose to the cadaster the value she places on each unit of stock she owns. Obviously she must place a value on the last unit of this stock at almost exactly the market value of the stock, given that she can always buy another unit of stock at this price. However, following our discussion of substitutable assets in II.C above, she may well value inframarginal units of stock above marginal units. For example, owning at least one share of this stock may provide her some diversification or insurance value, which would disappear if the company were entirely acquired by a new owner. She may have a sentimental attachment to the independent existence of the firm. Or she may be a consumer of the firm's products, and believe that if entirely taken over, the firm will act less in her interests. Whatever the reason, she may choose to assess her inframarginal shares above the value of her marginal shares.

For concreteness, suppose there are a large number of individuals each owning three shares of a publicly traded company. Owners will set the value for their first share  $v_1$  very close to the value of  $v_1$  set by other individuals. This common value would be, in our world, the analog to the market price for the share. Individuals would update this value frequently as the market price fluctuates using an app that monitors such changes. Thus an individual interested in buying a third of the company will be able to do so at a price per share of  $v_1$  and anyone buying less than a third of the company will choose to do so by buying the first share offered by every owner. Notice that even before worrying about acquisitions, this would make the process of transacting shares much simpler than at present. There would be no need for centralized stock markets. Individuals wishing to sell would simply lower  $v_1$  ever so slightly below other individuals' values of  $v_1$  and their shares would immediately be snapped up. Individuals wishing to purchase would simply do so at the lowest set of available values of  $v_1$ . The cadaster itself would act as an always-available limit order book. This would also solve the problems of illiquidity and capital valuation that have plagued the markets for a variety of securities, especially

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<sup>99</sup> Sanford J. Grossman & Oliver D. Hart, Takeover Bids, The Free-Rider Problem, and the Theory of the Corporation, 11 *Bell J. Econ.* 42 (1980).

<sup>100</sup> In re Appraisal of Dell, Inc., 2016 Del. Ch. LEXIS 81 (Del. Ch., May 31, 2016). See Hideki Kanda & Saul Levmore, The Appraisal Remedy and the Goals of Corporate Law, 32 *UCLA L. Rev.* 429, 434 (1985).

during times of financial distress. It would also make accounting and capital regulation much easier and more transparent.

It would also aid in the process of corporate acquisition. Individuals would likely value their second share at a value  $v_2$  significantly higher than the value for their first share  $v_1$ . They would know that anyone choosing to buy this second share would be seeking a majority stake in the company and would thus price this share at the value of losing control of the company for shareholders like herself.<sup>101</sup> This value would presumably be higher than the value of the marginal share, because of both the reduced control and the reduced diversification. Individuals would value their third share  $v_3$  even more highly, as its sale would be associated with the complete acquisition of the firm, and its removal from the market. Thus the price per share for a controlling stake and for a full acquisition would be increasingly more expensive than for just buying a few shares. Individuals would be taxed on their total valuation of their stake in the company,  $v_1 + v_2 + v_3$ , at a rate equal to the turnover in shares in the simplest setting.<sup>102</sup>

While it would be more expensive per share than buying only a few shares, the process of acquisition would be enormously simplified. Because of the tax, the cost of purchase would exceed the value to current owners of maintaining the corporation's independence by far less than at present or not at all, reducing the premia that inhibit efficient corporate takeovers. More importantly, the elaborate freeze-outs, negotiation and other procedures could be avoided entirely as fair prices for all assets would be publicly available and thus the market for corporate control could be as liquid and

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<sup>101</sup> An important consideration in this setting is that the chance of any individual's share being pivotal to an acquisition strategy is quite small. As a result, unless the rate of the Harberger tax is set exactly right, distortions to valuations can be quite large; see George J. Mailath &, Andrew Postlewaite, *Asymmetric Information Bargaining Problems with Many Agents*, 57 *Rev. Econ. Stud.* 351 (1990), for a more formal rendition of this argument. This differs from the case of property that is either bought (or at least may be bought) independently, where individuals are quite likely to be pivotal in determining whether a sale proceeds. In those settings, a Harberger tax that is not set perfectly still does quite well, as individuals have a strong incentive to report their values correctly to avoid affecting the chance of sale. When individuals have a very small chance of being pivotal, Harberger taxation is unlikely to be very effective in practice as it will require too fine tuning of the tax rates. In these cases, mechanisms based on the assumption that individuals are unlikely to be pivotal (such as the efficient voting mechanism such as proposed by Steven P. Lalley & Glen Weyl, *Quadratic Voting* (Working Paper, 2016)) will tend to perform better. For an efficient and practical proposal for these cases that is complementary with our ideas here see Eric Posner & Glen Weyl, *Quadratic Voting as Efficient Corporate Governance*, 81 *U. Chi. L. Rev.* 251 (2014). When the pivotality of individuals is intermediate (such as when there is some chance that an individual's second shares will be bought by a purchaser who does not want all shares, but just a large block), some combination of these two approaches will be optimal, such as a baseline of allowing Harberger purchases, but with the right of a purchaser or sufficient owners to trigger a quadratic vote on an offer. This logic also applies to other domains where individuals are unlikely to be pivotal, including some of the externality evaluation examples we discuss below.

<sup>102</sup> In a richer design, marginal shares would be taxed more heavily than inframarginal shares, given that the optimal turnover for these is less frequent (corporate acquisitions are less common than are small transactions), though there would have to be careful design of the definition of these categories to avoid gaming.

low-transaction cost as the market for small stakes in firms. The potential acquirer would simply read off of the cadaster the price for acquiring the firm and lock these prices in if the cost seemed worth paying. The hold-out problem would be eliminated; conflicts of interests among stakeholders would no longer cause delay and cost.

To be sure, the system would raise certain questions and come with its own set of costs. In particular, individuals would need to receive real-time advice and automatically update the valuations of their shares to ensure that they do not get bought up when market values change rapidly by individuals with informational advantages. A natural way to ensure such a process worked smoothly would be to slow transactions and the updating of values, for example, only once a day. This might have other benefits in avoiding the costs associated with high-frequency trading, as emphasized by Eric Budish, Peter Cramton and John Shim.<sup>103</sup> Until such systems are in place, individuals would choose to value their shares somewhat above market value to account for changing market conditions, just as Lawrence Glosten and Paul Milgrom show market makers do at present to guard against exploitation by informed traders.<sup>104</sup>

### **C. Property Transactions**

The most direct and ambitious application of our approach is to traditional property transactions, as these cover the largest range of economic activity. We now discuss how it would apply to real property, personal property and to an area where we expect it to yield the greatest benefits, eminent domain.

#### **1. Real Property**

The application of our approach to real property builds on institutions that are largely in place. Currently, when people buy real property they register their ownership in a public recording system.<sup>105</sup> Moreover, in most places people must pay property taxes based on the appraised value of their real property. Our approach adds three elements. First, individuals must report a self-assessed value for their property, which they may update at any time unless a buyer has asked for the price to be frozen so that she can look at the property. The owner's self-assessed valuation would replace the current practice of appraiser-generated valuations. Second, the owner must pay a tax based on his self-assessed

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<sup>103</sup> Eric Budish, Peter Cramton, & John Shim, The High-Frequency Trading Arms Race: Frequent Batch Auctions as a Market Design Response, 130 Q. J. Econ. 1547 (2015).

<sup>104</sup> Lawrence R. Glosten, Paul R. Milgrom, Bid, Ask and Transaction Prices in a Specialist Market with Heterogeneously Informed Traders, 14 J. Fin. Econ. 71 (1985).

<sup>105</sup> See Abraham Bell & Gideon Parchomovsky, Of Property and Information, 116 Colum. L. Rev. 237 (2016), for details.

valuation. Third, the owner must sell his property to anyone who offers to buy it for the amount of the self-assessed value.

As we have discussed, this approach solves the monopoly problem by making it unnecessary for buyers to negotiate a price. In addition, the tax—a form of Pigouvian tax that forces owners to internalize the cost of pricing property above the reservation price—raises revenues without causing distortions in behavior, unlike a property tax. As a result, widespread implementation of a self-assessment tax would be accompanied by reduction of income and other revenue-raising taxes, including the ordinary property taxes currently in place, by deductions for investment in property and/or by increases in socially valuable public expenditures on goods such as basic scientific research.

While the system may seem radical, it exhibits important continuities with the existing regime of property law. Under the current system, people are not perfectly secure in their rights to real property. Most people who own homes do so subject to mortgages; if they lose their job and miss payments, the holder of the mortgage may force a sale. Even more people are renters and have at best a tenuous claim on retaining their residence past the end of their lease. Everyone is subject to the risk of eminent domain, which allows governments to take real property if they pay a judicially-determined “market price.” Note that the market price award in eminent domain proceedings will almost certainly be lower than the self-assessed price that an owner would receive under the proposed system because the self-assessed valuation includes one’s subjective or idiosyncratic enjoyment of one’s real property.<sup>106</sup> People should be indifferent as to whether their property is taken by the government or taken by a private individual. Moreover, people who deeply care about keeping their home can reduce the risk of a (private or public) taking to an extremely low level by announcing a high self-assessment.

Our mechanism would also not be entirely unfamiliar to ordinary people. When people buy insurance, they effectively provide a self-assessed valuation to the insurance company. The premium on the insurance, like the Harberger tax, ensures that people do not exaggerate their valuation—if they do, they must pay a higher premium. At the same time, they will be willing to self-assess a high value and pay a high premium if the insured-against loss is significant enough. Insurance law puts limits on people’s freedom to self-assess: it is illegal for insurance companies to cover an amount greater than the anticipated loss. But within this limit, people can buy as little or as much insurance as they want.

An interesting and pertinent example is life insurance. When a person buys life insurance from an insurer, she necessarily reveals to the insurance company her prediction about the economic loss

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<sup>106</sup> On the pervasiveness of undercompensation in eminent domain proceedings, see Christopher Serkin, *The Meaning of Value: Assessing Just Compensation for Regulatory Takings*, 99 *Nw. U. L. Rev.* 677 (2005).

that will be suffered by beneficiaries if the insured dies. This is otherwise private information. The premium cost ensures that the insured will state an accurate prediction, to the best of her ability.

Moreover, various other legal doctrines work in different ways to counter the harmful monopoly effect of private property, and in doing so create the risk that an owner will be effectively forced to sell an entitlement. Consider the following examples:

Liability rules for inadvertent destruction. If a neighbor's tree topples over and crashes into your house, you do not have property-rule protection; you are only able to sue for damages under a liability rule. Indeed, damages could be zero if the tree was not maintained negligently. While these legal rules are second nature to a lawyer, they are at variance with monopoly. If the logic of the traditional libertarian position were maintained, the neighbor should have bargained for the right to allow his tree to fall and damage your property; having failed to do so, he would go to jail. But under such a system, people would be reluctant to leave their basements. The liability rule is used to soften monopoly power in settings where it would be prohibitively expensive for people to refrain from infringing on other people's property rights.

Necessity. In a similar vein, the law permits people to intentionally infringe on property rights in emergency situations as long as they pay the market value of the owner's loss. In *Vincent v. Lake Erie*, a ship captain secured his ship to a dock despite orders to leave because a storm would have sunk the ship if he had taken it out to sea. The court held that the ship owner must pay only for the damage the ship did to the dock despite the intentional infringement on the dock owner's property rights.<sup>107</sup> As in the case of inadvertent harm, the necessity rule weakens the monopoly power of the owner so as to allow for an allocatively efficient transfer—in this case, occupation of the dock from the owner to the ship owner.<sup>108</sup>

Adverse possession. The rule of adverse possession<sup>109</sup> can also be explained by our framework. When the owner does not object to an overt and hostile use of his property, the owner's valuation of the property is likely to be low, lower than that of the adverse possessor who has invested in the same property despite the risk that he will not gain title to it. This complicated mix of encroachment and non-interference provides evidence that the transfer is allocatively efficient because the self-assessed

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<sup>107</sup> *Vincent v. Lake Erie Transp. Co.*, 109 Minn. 456 (1910).

<sup>108</sup> See Cooter & Ulen, *supra* note \_\_, at 100.

<sup>109</sup> See Thomas J. Miceli & C.F. Sirmans, *An Economic Theory of Adverse Possession*, 15 *Int'l Rev. L. & Econ.* 161, 164 (1995); William C. Marra, *Adverse Possession, Takings, and the State*, 89 *U. Det. Mercy L. Rev.* 1, 14-15 (2011).

value is likely to be close to zero.<sup>110</sup> Related doctrines give the public easements over private property over which the public has customarily traveled.<sup>111</sup>

Air rights and related restrictions. Because the common law of property evolved centuries ago, legislatures have from time to time adjusted property rights to reflect new technologies and changing conditions. The most famous example involves air rights. Under the common law, landowners owned rights to the space over their property, extending indefinitely into the ether. With the development of air travel, legislatures passed laws that restricted air rights to the space below the flight paths of airplanes. The legislatures recognized that the value of that space to the landowner is close to zero, but she could use it to extract monopoly rents from airlines. To solve this problem of allocative efficiency, legislatures simply modified the property right.<sup>112</sup> In cases of conflict—where air travel at low heights interfered with enjoyment of one’s property—courts have agreed that the landowner should receive market damages but not the right to block airplanes from flying over their property.<sup>113</sup>

Public trust doctrine and other related public property rights. Many types of property are owned publicly, or are subject to public regulations that greatly limit the ability of private individuals to control and exploit the property.<sup>114</sup> More than a billion acres of land in the United States are owned by the national government and preserved as wilderness, rangeland, and national parks. Navigable rivers and coastal areas are also typically owned or controlled by the national or state governments. In many states, beaches are publicly owned or open to the public via easements. Governments build roads and either provide drivers with free access or charge a toll. They preserve and regulate fisheries off the coasts. While standard public-good explanations go a long way to explaining these doctrines,<sup>115</sup> they also illustrate our particular concern with the monopoly problem.

Consider, for example, the widespread government ownership of grazing areas.<sup>116</sup> Suppose that pastures flourish without any sort of complicated investment scheme; the only way to “invest” in a pasture is to ensure that it is not destroyed through overgrazing. Further, suppose that experience and expertise can determine optimal grazing in a relatively objective way. We might therefore believe

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<sup>110</sup> See Lee Anne Fennell, *Efficient Trespass: The Case for “Bad Faith” Adverse Possession*, 100 *Nw. J. L. & Ethics* 1037 (2006).

<sup>111</sup> Carol Rose, *The Comedy of the Commons: Custom, Commerce, and Inherently Public Property*, 53 *U. Chi. L. Rev.* 711, 723-27 (1986).

<sup>112</sup> See Troy A. Rule, *Airspace in an Age of Drones*, 95 *B.U. L. Rev.* 155, 166 (2015).

<sup>113</sup> See *United States v. Causby*, 328 U.S. 256 (1946).

<sup>114</sup> For a brief survey, see Merrill, *supra* note \_\_.

<sup>115</sup> See Merrill, *supra* note \_\_; Rose, *supra* note \_\_.

<sup>116</sup> See Bureau of Land Management, *Fact Sheet on the BLM’s Management of Livestock Grazing*, Dep’t of the Interior (last visited July 29, 2016), See <http://www.blm.gov/wo/st/en/prog/grazing.html>.

that the government need not delegate pastures to private individuals in the form of property rights: the investment problem is simple enough to be solved through a straightforward licensing scheme that limits the number of users. Then the issue is only one of allocative efficiency: ensuring that cattle owners who benefit the most from the pasture are the ones who use it. This can be easily accomplished with an auction that grants access to the highest bidders.<sup>117</sup> Through public ownership, efficient allocation is achieved without a sacrifice of investment incentives. A similar argument can be made about fisheries. By contrast, we suspect that investment efficiency for highways is more complicated. The question is not just one of how many cars should drive on a road, but how much money should be invested in maintenance, safety improvements, and the like. This might explain why private toll roads exist alongside public roads.

Property law scholars have long recognized that “public property” doctrines may be justified in part by monopoly problems, including the problem of assembling pieces of privately owned land (often called the hold-out problem) and the problem of denial of access that would occur if a single person owned a roadway or navigable river.<sup>118</sup> A monopoly problem can also arise when one person mistakenly builds on another person’s land.<sup>119</sup> However, as noted above, it also very much the tendency of the law and economics literature to treat the monopoly problem as exceptional—justifying a limited number of legal exceptions to the dominant paradigm of private property.<sup>120</sup>

Takings for private use. Federal takings law limits eminent domain to “public use,” but the Supreme Court has all but read this limitation out of the Constitution. In *Kelo v. New London*, it held that a city could condemn private property in order to make way for private economic development.<sup>121</sup> While the Court’s holding produced a public outcry,<sup>122</sup> it endorsed a longstanding government function, which Abraham Bell has aptly called “government-mediated private takings.”<sup>123</sup> Not only have cities and states used eminent domain to obtain property which was resold to developers, they have frequently delegated the eminent domain power to private companies, including railroads, bridge builders, and riparian owners who built dams that flooded their neighbors.<sup>124</sup> As Bell persuasively argues,

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<sup>117</sup> Under the current system, fees are determined largely by mimicking the market—the public grazing lands exist alongside privately owned fields, which are leased out. See *id.* In a more comprehensive system, in which there is no comparable private market, auctions would need to be used.

<sup>118</sup> Rose, *supra* note \_\_; Merrill, *supra* note \_\_, at 91-92.

<sup>119</sup> *Id.* at 92.

<sup>120</sup> See *supra*.

<sup>121</sup> *Kelo v. City of New London*, 545 U.S. 469 (2005).

<sup>122</sup> Somin, *supra* note \_\_, at 2108-14.

<sup>123</sup> Abraham Bell, *Private Takings*, 76 U. Chi. L. Rev. 517, 548-49 (2009).

<sup>124</sup> *Id.*, at 545-46.

“private takings” are justified when bargaining failures prevent the transfer of property from less valued to more valued uses through private consensual transactions—what we have called the monopoly problem. However, Bell does not come to grips with the serious problem of valuation. He argues that fair market value can be used to value property for the purpose of “private takings,”<sup>125</sup> as it does for public takings, but market value is not an accurate estimate of the value of property in precisely the circumstances in which private taking power is justified—when monopoly problems interfere with bargaining. Bell suggests that damages could be set above fair market value in order to prevent undercompensation,<sup>126</sup> but that just creates the corresponding risk of overcompensation, which blocks value-maximizing sales.

## 2. Personal Property

Unlike the case of real property, few legal doctrines address the monopoly problem for personal property. Of course, if a person accidentally—rather than intentionally—takes another person’s umbrella, the victim’s remedy is just the return of the umbrella, so in this sense the property right is not as strong as it could be. And in principle, eminent domain is available for personal property. But it is rarely used. We can imagine two reasons for the stricter treatment of personal property. First, it is more likely to trade in a competitive market, so the owner of an umbrella or other object will rarely have more than a trivial amount of market power. Second, many types of personal property are not durable, except trivially—prepared food, for example. On the other hand, people rarely need to invest in everyday types of personal property (except, perhaps, to avoid breaking them), so property-rule protection hardly seems necessary.

It is worth exploring what the world would look like if the self-assessment tax were applied to personal property. We use automobiles as our running example; as durable and valuable goods, they are a good candidate for such a tax. Imagine that when a person buys a car, she registers the title through an app supplied by the government. She also writes down her personal valuation of the car, which (presumably) exceeds the price she paid. The app would periodically ask her to update her valuation of the car. She could also use a setting to allow the app to calculate her valuation by itself using a formula that starts with her valuation but depreciates it over time according to usage (a GPS device would automatically register mileage with the app, which would use data from another sensor to record wear and tear on brakes and other components).

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<sup>125</sup> *Id.*, at 580-81.

<sup>126</sup> *Id.*

Other people could take the car using the same app on their own phones. Suppose someone sees the car parked on the street and likes the way it looks. He scans in the car's VIN and his app reveals the car's current valuation. He hits a button and money is transferred from his bank account to the owner's. He can use his app to unlock the car door, start the engine, and drive away.

Before we address the problems with this plan (many of which will already have occurred to the reader), let us consider the benefits. The days of bargaining with car dealers would be over. The future car dealership would, in effect, be the whole world rather than a particular building that one must visit. Selling a car would also be immensely easier. One could instruct the app to progressively lower the price until someone pays it. (Potential buyers could set their apps with the specifications and prices they are willing to pay for cars. When a match is made, the location of the car is disclosed to the buyer who can go pick it up.) The currently high transaction costs associated with buying and selling cars would be reduced to zero. And people who develop a sentimental attachment to their car can register a higher self-assessed valuation and pay the additional tax to fend off buyers.

Now let us turn to the problems. What if you drive to a remote location and someone buys your car, leaving you stranded? This problem could be addressed using the approach we outlined in Subsection III.C above: allowing individuals to delay delivery of a possession in a pre-specified manner and subject to certain rules. Or what if you have some valuable goods or personal documents in your trunk when another person drives off with your car? These documents could simply be listed separately from the car as possessions; the law would require the return of any property not purchased by the buyer. Furthermore, people would come to think of themselves as leasing rather than owning cars, and would be careful about leaving valuables in their cars if they have a low self-assessed value, just as they do when they rent a car from Hertz or Avis, or use a Zipcar. Finally, what if you have developed a sentimental attachment to your car—you've spent years tinkering with the engine and lovingly polishing the chrome fenders? Are you really required to take the risk that someone will drive off with your car?

This last problem was addressed in Subsection III.B above. Those of us who care deeply about our automobiles know that there is a small risk that they will be stolen or totaled in an accident. We accept these risks as a part of life. Through a high self-assessment, we can ensure that the risk of someone taking the car is similarly remote—and, in addition, if she does, we can ensure that we will be fully compensated for the sentimental loss.

### 3. Eminent Domain and the Problem of Valuation

One of the great problem of takings law is that of valuation. Courts typically award owners the market value of their property but commentators have complained that in doing so they disregard the subjective valuation of owners, who frequently have sentimental attachment to their houses and neighborhoods.<sup>127</sup> In addition, appraised valuations of real property are notoriously unreliable.<sup>128</sup> As a result, owners are usually undercompensated.<sup>129</sup> Under the self-assessment approach, the government would pay the self-assessed valuation, which would reflect the owner's subjective enjoyment of her real property. This was one of the justifications for Levmore's proposal, and for Bell and Parchomovsky's elaborations upon it.<sup>130</sup>

However, the self-assessment tax would, in fact, make eminent domain significantly less important than it currently is (as Levmore himself recognized).<sup>131</sup> To see why, observe that eminent domain is most frequently used to put together transportation networks—roads, railroads, canals, and so on. Under our approach, government involvement in constructing these transportation links is no longer necessary because private companies could buy up adjoining plots using the self-assessed valuation. The hold-out problem, which is the only justification for government intervention through eminent domain, is solved without government involvement. In fact, while we do not pursue this application further here, this approach could be extended to regulatory takings if individuals could list values for various sub-entitlements, such as the right to use their land in various ways.

Even under our regime, governments would continue to use “eminent domain”—for example, to obtain property for government buildings, military bases, and other public facilities. However, there would be no distinction between such uses and an ordinary purchase by a private party. Eminent domain based on self-assessment taxes has been tried, but has been unsuccessful because the probability of a taking is so low that people have a strong incentive to undervalue their property.<sup>132</sup> It may be that governments set the multiplier improperly; but the real problem is that if forced sales are extremely rare, people will not take seriously the risk that they will occur, or will have trouble calculating a self-assessment based on a very low and uncertain probability.

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<sup>127</sup> Serkin, *supra* note \_\_\_\_.

<sup>128</sup> See Yun-Chien Chang, *Economic Value or Fair Market Value: What Form of Takings Compensation Is Efficient?*, 20 *Sup. Ct. Econ. Rev.* 35, 49-53 (2012).

<sup>129</sup> Serkin, *supra* note \_\_\_\_.

<sup>130</sup> Abraham Bell & Gideon Parchomovsky, *Taking Compensation Private*, 59 *Stan. L. Rev.* 871 (2007); Abraham Bell & Gideon Parchomovsky, *Takings Reassessed*, 87 *Va. L. Rev.* 277 (2001).

<sup>131</sup> Levmore, *supra* note \_\_\_\_.

<sup>132</sup> Yun-Chien Chang, *Self-Assessment of Takings Compensation: An Empirical Study*, 28 *J. L., Econ. & Org.* 265 (2012).

## VII. Is the Harberger Tax Unconstitutional?

The Harberger tax, if applied prospectively, is clearly constitutional. Imagine that the government decides to subject land that it owns to the Harberger tax. Rather than lease the land out for grazing, it announces that it will “sell” the land subject to the Harberger tax regime. The government could implement the regime by initially auctioning off plots of land. The winners of the auction would periodically self-assess the value of the land and pay a tax based on that value, and be required to transfer the land to anyone who offered to buy it at the self-assessed value. As we have discussed, a similar approach could be put into place for various types of administrative property, such as unallocated spectrum and domain names.

We see no constitutional objection to this arrangement. Property owned under the Harberger tax regime is very similar to a leasehold. We can think of the owner’s property rights as those of a lessee where the lease provides that the term is unlimited—that is, not for a definite period—but subject to termination whenever a third party offers to pay a higher “rent” (that is, tax) to the landlord (the government), who exercises the right to reassign the lease to that third party. Since the government can own property and lease it out, and the law of property gives the landlord great freedom in designing the terms of the lease, constitutional law does not bar this arrangement.

But we also envision that Harberger tax regime replacing the current system of property rights—as applied to some or many categories of property—and such a transition would raise questions relating to the Takings clause of the Fifth Amendment.<sup>133</sup> Imagine, for example, that a state government announced that henceforth all real property would be subject to the Harberger tax. Although taxes are not subject to the Takings clause,<sup>134</sup> the Harberger tax is more than a tax. It involves an additional element, the extinction of a significant element of the right to exclude.<sup>135</sup> This right is of considerable value to the owner.

Would the Harberger tax therefore violate the Takings clause? We think not. The Harberger tax is a redefinition of property rights of the sort that has occurred many times in American history. For example, early in the Republic, many states abolished the fee tail, converting then-existing entailed estates into fees simple. This change in property law extinguished a valuable right possessed by direct descendants of the original grantee: to obtain the estate in fee tail upon the death of the last holder of

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<sup>134</sup> See Eduardo Peñalver, *Regulatory Taxings*, 104 *Colum. L. Rev.* 2182 (2004).

<sup>135</sup> From an economic perspective, the forced revelation of the owner’s valuation is also a cost. See *supra*. We suspect a court would not regard this requirement as a property-rights infringement, though we are not sure. On whether private information is property subject to the Takings clause, see *Ruckelshaus v. Monsanto Co.*, 467 U.S. 986 (1984).

the estate in fee tail, regardless of that person’s intent. The abolition of the fee tail effected a transfer of wealth to the holders of the estate in fee tail, who were suddenly free to sell the land, or dispose of it in their will as they chose. Nonetheless, the laws abolishing the fee tail were considered constitutionally unproblematic. James Madison himself approved of the abolition of the fee tail in Virginia, and presided over its abolition in federally owned territories while he was president, apparently without believing that the extinction of the fee tail violated the Takings clause.<sup>136</sup> Madison believed in private property as a general matter but complained that the fee tail resulted in a “too unequal distribution of property, . . . which generated examples in the opulent class inauspicious to the habits of the other classes.”<sup>137</sup> Abolition of the existing entails would redistribute wealth and help weaken the rentier class.

While the pecuniary effects of the abolition of the fee tail were probably not large, two other changes in property rights in America were of great significance. The abolition of slavery—of property rights in human beings—effected a massive redistribution of wealth from slave owners to former slaves. And the abolition of coverture transferred a huge amount of wealth (specifically, the entitlement to the wife’s wages and the income from the wife’s property) from husbands to wives. While the question of whether slave owners could be deprived of their property without compensation gave rise to great controversy that was resolved only by war, the abolition of the property rights of married men seems to have taken place without any debate about its constitutionality under the Takings clause or related state takings clauses.<sup>138</sup> These precedents might be taken to establish a principle that the Takings clause does not apply to redefinitions of property rights, similar in spirit to treatment of taxation under that clause, and very much in the spirit of the view that the Takings clause is intended to prevent “singling out” of individuals to bear public burdens but not to block largescale changes in the distribution of wealth.<sup>139</sup>

Under modern doctrine, however, an argument could be made that the Harberger tax would count as a regulatory taking that requires compensation. The thickets of the regulatory taking doctrine are too deep for us to enter within the confines of this Article.<sup>140</sup> We have found no cases involving

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<sup>136</sup> John F. Hart, “A Less Proportion of Idle Proprietors:” Madison, Property Rights, and the Abolition of Fee Tail, 58 Wash. & Lee L. Rev. 167 (2001).

<sup>137</sup> Hart, *supra* note \_\_\_, at 190, quoting Madison.

<sup>138</sup> We scoured the history books and found nothing on this topic. See, e.g., Hendrik Hartong, *Man and Wife in America: A History* (2000); Peggy A. Rabkin, *Fathers to Daughters: The Legal Foundations of Female Emancipation* (1980); Norma Basch, *In the Eyes of the Law: Women, Marriage, and Property in Nineteenth-Century New York* (1982).

<sup>139</sup> See, e.g., *Pennell v. City of San Jose*, 485 U.S. 1, 21-22 (Scalia, J., concurring in part and dissenting in part).

<sup>140</sup> See Peñalver, *supra* note \_\_\_.

anything resembling the Harberger tax, and the standard precedents are too complex and inconsistent to provide a clear basis for evaluating the tax. However, it is reasonably clear that the Harberger tax would satisfy the toothless “public use” requirement because it aims to improve the general welfare. Indeed, the aim of facilitating transfers is similar to the goal of the Hawaii statute that abolished an oligarchic system of property rights by forcing sales of housing to private citizens, a goal which was approved by the Supreme Court in *Hawaii Housing Authority v. Midkiff*.<sup>141</sup>

And if a court concluded that the government must pay compensation to those who lost money as a result of the transition to the Harberger tax, then the efficiency of the regime is such that payment of such compensation would be possible. Still, given the vastness of the sums involved, it would probably be necessary to introduce the Harberger tax gradually, over a period of time. This could be done by initially applying the tax to limited categories of property, or setting it at a very low rate, and then expanding the categories and increasing the rate over time. The government could also, in principle, sell bonds to finance eminent domain proceedings against property-owners, and then auction off the property subject to the Harberger tax, using the proceeds from the auctions and the tax to repay the bonds.

## **VII. Conclusion**

Private property as usually conceived has become an impediment, rather than a necessary component, of the operation of a vigorous market economy. We propose a simple scheme based on the taxation proposal by Arnold Harberger that would harness recent advances in technology to remedy the monopoly power created by private property. We showed how this proposal could be made to work in practice and could improve the efficiency of allocation of administrative property rights in the near term and of broader property rights in the medium term.

The benefits from a Harberger tax would be massive. To get a rough sense of its value, consider a house that is occupied by an owner in an illiquid rural market who would strongly prefer to sell it but still has some value for occupying it. The current owner gains a utility equivalent to a monthly rental value of \$1,000 from occupying it. Supposing that she expects this rental value to continue into the indefinite future and that the discount rate is 5%; this corresponds to a value for the house of \$240,000. Appraisers value the house at \$360,000 (or a monthly rental value of \$1,500). Finally, suppose that buyers come along once every three months and have a value for the house that

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<sup>141</sup> *Haw. Hous. Auth. v. Midkiff*, 467 U.S. 229 (1984). See also *Kelo v. City of New London*, 545 U.S. 469.

has the same modal value as the appraised value, but has substantial spread. The owner maximizes her return by listing the house at a price of \$480,000, an amount that compensates her for the expected delay from failing to make sales at a lower price. At this price it takes two years to sell the home. A typical person who would have bought the house if the owner had listed it at \$240,000 but would not buy at \$480,000 would value the house at the appraised value of \$360,000. As a result the house is sub-optimally occupied for 21 months, losing \$500 of social value for each of these months or a total of \$10,500.

Suppose this property gets into a similar situation once every five years; in this case, over the life of the house, the total expected discounted loss from such failure to make efficient transfers of the house is approximately four times the loss in any single episode or a total of \$42,000 or about 12% of the appraised value of the house. Weyl and Zhang's calculations suggest that this is a bit greater than the loss on a typical house in the United States, which is closer to 10%.<sup>142</sup> They furthermore calculate that, at best, Harberger taxation could alleviate 80% of these harms and that imposing such a tax (of 15% per year) would reduce the value of houses by 5% because of reduced investment.<sup>143</sup> As a result they suggest a 7% tax which they calculate only reduces investment value by under 2% and still achieves more than 70% of the total allocative benefits, thereby overall increasing the value of the housing stock on average by 6%.<sup>144</sup> As the housing stock is currently worth approximately \$28.5 trillion, the benefit of Harberger taxation for the housing sector alone is more than \$1.5 trillion. The benefits would be further increased if the tax were applied to automobiles, spectrum, art, and so on.

However, we believe the scope of the benefits Harberger taxation offers extend to many areas of the law well beyond the standard conceptions of property law. While some of these applications may seem farfetched and are beyond the scope of our main argument, we conclude by speculating on how our proposal may be extended to these other areas of law.

We begin with the narrowest and most conservative application, one discussed also by Weyl and Zhang. Ronald Coase famously argued that a principal reason for the existence of firms was to overcome the transaction costs of the market.<sup>145</sup> Coase identified these costs with bargaining costs primarily, but our analysis suggests that the market power created by private property may lead to

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<sup>142</sup> Weyl & Zhang, *supra* note \_\_\_\_.

<sup>143</sup> *Id.*

<sup>144</sup> PropertyWire, Value of US Housing Stock in 2015 Down from Overall Growth the Previous Year, January 15, 2016, <http://www.propertywire.com/news/north-america/us-housing-stock-values-2016011711444.html>.

<sup>145</sup> R.H. Coase, *The Nature of the Firm*, 4 *Economica* 386 (1937).

“double marginalization” problems that reduce the efficiency of production.<sup>146</sup> Corporations may thus serve as a way to avoid monopoly problems within a firm. However, as Grossman and Hart emphasize, contracts also aim to encourage investment in corporate assets.<sup>147</sup> These ideas have almost exclusively been conceived in terms of absolute ownership by one agent or another, however. Our analysis suggests that investment incentives and allocative efficiency may be more fully optimized by contracts using Harberger taxation within the firm to achieve partial ownership of assets by different individuals and the efficient reallocation of assets among different groups within the corporation. This could help make more practical (and consistent with investment incentives) Ted Groves and Martin Loeb’s vision of using the Vickrey auction to allocate resources within firms.<sup>148</sup>

Harberger taxation could also be applied to intellectual property rights to deal with the infamous problem of patent thickets and trolls.<sup>149</sup> If intellectual property had to be self-assessed and was taxed, with corresponding increases in its length and possibly even the payment of some of the associated fees to the original inventor to maintain incentives to innovate, this might significantly mitigate the problem of patent trolls buying up swaths of intellectual property just to hold-up potential users.<sup>150</sup> It would also help avoid the holdout problems associated with assembling many complementary intellectual property rights to create standards or products that require many patents together.<sup>151</sup>

Consider also extension of the Harberger tax to rights not to be harmed by pollution or other externalities. Under the current legal system, courts and regulator struggle mightily to determine fair valuations.<sup>152</sup> Rather than these harms being dealt with by juries and benefit-cost analysis based on econometric estimates of the statistical value of life, individuals might self-assess the value of various harms to their life or quality of life, being forced to pay taxes based on their self-assessed valuations,

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<sup>146</sup> These problems arise when two firms both having market power produce complementary products, as each seeks to earn a monopoly rent, and in the process they earn less total profits than they could by charging only a single monopoly rent. See Antoine Augustin Cournot, *Researches into the Mathematical Principles of the Theory of Wealth* (1838) and Joseph J. Spengler, *The Population Obstacle to Economic Betterment*, 41 *Am. Econ. Rev.* 343 (1951) as well as Michael Heller, *The Gridlock Economy: How Too Much Ownership Wrecks Markets, Stops Innovation, and Costs Lives* (2008).

<sup>147</sup> Grossman & Hart, *supra* note \_\_\_\_.

<sup>148</sup> Theodore Groves & Martin Loeb, *Incentives in a Divisionalized Firm*, 25 *Mgmt. Sci.* 221 (1979).

<sup>149</sup> Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 *Sci.* 698 (1998).

<sup>150</sup> Lauren Cohen, Umit G. Gurun & Scott D. Kominers, *The Growing Problem of Patent Trolling*, 352 *Sci.* 521 (2016).

<sup>151</sup> For a proposal along these lines, see Michael Abramowicz & John F. Duffy, *Ending the Patenting Monopoly*, 157 *U. Pa. L. Rev.* 1541, 1598-1600 (2009).

<sup>152</sup> See Eric Posner & Cass R. Sunstein, *Dollars and Death*, 72 *U. Chi. L. Rev.* 537 (2005).

and then receiving damages based on these valuations if they are injured as a result of a tort.<sup>153</sup> The Harberger tax would solve the problem of valuation in tort cases just as it does for eminent domain cases, allowing regulators and juries to focus on issues of causation.<sup>154</sup>

In the most radical extension, Harberger taxation of human capital could be extended to labor. Individuals could be forced to assess the value of their potential income (the value of their time) rather than being taxed on their actual income. This would eliminate the distortionary effects of labor income taxation and the monopoly power that talented workers exert over employers. Employers who hire this labor would then be forced to pay taxes on the labor they now possess, reducing the market power of employers over labor vis-à-vis another potential employer, which they now possess as a result of firm-specific investments by workers, covenants not to compete, and related factors.

All of these extensions, especially the last, raise numerous questions, practical challenges and philosophical concerns that are far beyond our ability to confront here. However, we do believe that Harberger taxation has the potential to resolve a range of legal and social problems beyond those directly addressed here. It is an exciting topic for future research.

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<sup>153</sup> Joseph E. Aldy and W. Kip Viscusi, Adjusting the Value of a Statistical Life for Age and Cohort Effects, 90 *Rev. Econ. & Stat.* 573 (2008).

<sup>154</sup> Such a system would have to be designed to ensure that whatever individuals were asked to value (such as a chance of death) was something that they were sufficiently likely to be pivotal on. This might be reasonable for mortality risk, but not for the destruction of an endangered species. In the latter cases, efficient voting mechanisms like the Quadratic Voting rule proposed by Lalley & Weyl, *supra* note \_\_\_, and Eric A. Posner & Glen Weyl, Voting Squared: Quadratic Voting in Democratic Politics, 68 *Vand. L. Rev.* 441 (2015), are more appropriate.