

The Marginal Cost Controversy in Intellectual Property

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In 1938, Harold Hotelling formally advanced the position that “the optimum of the general welfare corresponds to the sale of everything at marginal cost.”¹ To reach this optimum, Hotelling argued, general government revenues should “be applied to cover the fixed costs of electric power plants, waterworks, railroad, and other industries in which the fixed costs are large, so as to reduce to the level of marginal cost the prices charged for the services and products of these industries.”² Other major economists of the day subsequently endorsed Hotelling’s view³ and, in the late 1930s and early 1940s, it “aroused considerable interest and [had] already found its way into some textbooks on public utility economics.”⁴

In his 1946 article, *The Marginal Cost Controversy*, Ronald Coase set forth a detailed rejoinder to the Hotelling thesis, concluding that the social subsidies proposed by Hotelling “would bring about a maldistribution of the factors of production, a maldistribution of income and probably a loss similar to that which the scheme was designed to avoid.”⁵ The article, which Richard Posner would later hail as Coase’s “most important” contribution to the field of public utility pricing,⁶ was part of a wave of literature debating the merits of the Hotelling proposal.⁷ Yet the very success of the critique by Coase and others has led to the entire contro-

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¹ Harold Hotelling, *The General Welfare in Relation to Problems of Taxation and of Railway and Utility Rates*, 6 *Econometrica* 242, 242 (1938). Hotelling incorrectly claimed that marginal cost pricing had previously been advocated by the nineteenth-century economist Jules Dupuit. See R.B. Ekelund, *Jules Dupuit and the Early Theory of Marginal Cost Pricing*, 76 *J Polit Econ* 462, 469 (1968) (concluding that “a short-run marginal cost theory cannot be attributed to Dupuit”).

² Hotelling, 6 *Econometrica* at 242 (cited in note 1).

³ See, for example, James C. Bonbright, *Major Controversies as to the Criteria of Reasonable Public Utility Rates*, 30 *Am Econ Rev Papers & Proceedings* 379, 385 (1941) (praising Hotelling’s article as “one of the most distinguished contributions to rate-making theory in the entire literature of economics”).

⁴ Ronald Coase, *The Marginal Cost Controversy*, 13 *Economica* 169, 169 (1946).

⁵ *Id.* at 180.

⁶ Richard A. Posner, *Nobel Laureate: Ronald Coase and Methodology*, 7 *J Econ Persp* 195, 197 (1993).

⁷ The extensive literature on both sides of the controversy is reviewed in Nancy Ruggles, *Recent Developments in the Theory of Marginal Cost Pricing*, 17 *Rev Econ Stud* 107 (1949).

versy being “largely forgotten today.”⁸ Modern regulatory policy generally accepts that a declining average cost industry—that is, a so-called “natural monopoly”—will not have its fixed costs subsidized from general government revenues and that therefore the industry must be allowed to price above marginal cost so that it can cover its fixed costs.⁹ The rejection of the Hotelling thesis is so complete that reputable economics encompasses the very opposite of Hotelling’s view—“that, generally, prices which deviate in a systematic manner from marginal costs will be required for an optimal allocation of resources, even in the absence of externalities.”¹⁰ Indeed, in the parlance of public utility regulation, the very phrase “marginal cost pricing” now refers not to Hotelling’s proposed marginal cost pricing and subsidy scheme, but rather to a pricing system akin to the “multi-part” pricing system that Coase advocated as the more efficient alternative to Hotelling’s proposal.¹¹ In short, modern public utility theorists generally do not recommend using pervasive public subsidies to chase the Holy Grail of global marginal cost pricing.

Yet despite this consensus, a recent vein of literature on the economics of intellectual property seems preoccupied with the perceived problem that prices for intellectual property may sometimes exceed marginal cost.¹² This literature proposes the institution of significant public subsidies to resolve or at least to ameliorate the marginal cost pricing problem, and such proposals are already beginning to affect the course of policy debate in prominent public fora.¹³ This literature has developed thus far

⁸ Posner, 7 J Econ Persp at 198 (cited in note 6).

⁹ See, for example, W. Kip Viscusi, John M. Vernon, and Joseph E. Harrington, Jr., *Economics of Regulation and Antitrust* 361 (MIT 2d ed 1995) (“[T]here are compelling reasons to accept the constraint that natural monopolies should operate such that total revenues and total cost are equated.”); Alfred Kahn, 1 *The Economics of Regulation: Principles and Institutions* 130 (Wiley 1970) (noting that “taxpayer-financed subsidies” present a theoretical solution to the contradiction between marginal cost pricing principles and the requirement that “total revenues equal total costs,” but concluding that “since governments do not usually follow this practice with respect to privately owned utilities, we devote no more attention to this way out of the conflict”).

¹⁰ William J. Baumol and David F. Bradford, *Optimal Departures from Marginal Cost Pricing*, 60 *Am Econ Rev* 265, 265 (1970) (emphasis removed).

¹¹ See Coase, 13 *Economica* at 175 (cited in note 4). See also R.H. Coase, *The Theory of Public Utility Pricing and Its Application*, 1 *Bell J Econ & Mgmt Sci* 113, 122 (1970) (noting that, because the more recent proponents of marginal cost pricing were championing not a policy of government subsidy but merely “a policy in which the advantages of making price equal to marginal cost are taken into account,” “no difference of any substance” remained between the opponents and proponents of marginal cost pricing).

¹² See Michael Abramowicz, *Perfecting Patent Prizes*, 56 *Vand L Rev* 115, 122 (2003); Steven Shavell and Tanguy van Ypersele, *Rewards versus Intellectual Property Rights*, 44 *J L & Econ* 525, 537–39 (2001); Michael Kremer, *Patent Buyouts: A Mechanism for Encouraging Innovation*, 113 *Q J Econ* 1137, 1147–48 (1998). See also Robert C. Guell and Marvin Fischbaum, *Toward Allocative Efficiency in the Prescription Drug Industry*, 73 *Milbank Q* 213, 221 (1995) (proposing a social subsidy to achieve marginal cost pricing in a single industry).

¹³ For example, in a recent op-ed published in the *Washington Post*, Northwestern economist Burton Weisbrod proposed that the government should make “massive awards . . . to the developers of safe and effective new patented pharmaceuticals” through a program of “purchas[ing] drug pat-

with little apparent recognition that it is a modern reprise of the marginal cost controversy of the mid-twentieth century. The literature treats the marginal cost pricing problem of intellectual property as a unique phenomenon, and it remains isolated from the more general literature on public utility regulation.

This Essay is a first step toward ending that isolation. Part I begins by establishing the parallels between the economic theory of public utility regulation and that of intellectual property law. Part II reviews the recent literature proposing public subsidies for intellectual property and shows that these proposals are subject to the same objections that Coase raised in the public utility context more than a half century ago. Furthermore, the recent subsidy literature has not examined the important question whether intellectual property possesses some distinguishing features that make it a more appropriate target for public subsidies than other industries having natural monopoly characteristics. Part III addresses this question and finds that, while there are distinctions between intellectual property and traditional natural monopolies, these distinctions do not uniformly favor subsidizing intellectual property over other natural monopolies. Part IV concludes with the hope that, as the marginal cost controversy continues in the field of intellectual property, it will proceed with a more complete understanding of the earlier controversy, and that perhaps it can offer new insight into a very old and very fundamental debate.

I. INTRODUCTION: INTELLECTUAL PROPERTY AS A SPECIAL CASE OF NATURAL MONOPOLY

In both legal and economic thought, the topic of intellectual property is typically segregated from that of public utility regulation.¹⁴ This segregation is unfortunate because intellectual property is in fact just a special case of the problem of natural monopoly, a subject familiar to public utility regulation.

ents." Burton A. Weisbrod, *Solving the Drug Dilemma*, Wash Post A21 (Aug 22, 2003). The motivations for this proposal are Weisbrod's observations that the "marginal production costs [for drug pills] are low" and that, because of patents, drug prices are "far higher than they should be, far higher than the cost of producing the pills, and far higher than is economically efficient." Id.

¹⁴ As one commentator has noted, "[n]atural monopoly theory creeps into the development of patent law from time to time." John W. Schlicher, *Patent Law: Legal and Economic Principles* § 2.14 at 2-40 (Clark Boardman Callaghan 1992). But legal authorities typically reject the analogy between the two because they focus on the *product embodying the intellectual property*, which usually can be produced competitively, rather than on the intellectual property itself. See, for example, *Fishman v Estate of Wirtz*, 807 F2d 520, 538 n 16 (7th Cir 1986) (reasoning that "[a] patent is not a natural monopoly in the same sense as is a franchise for the provision of electric power at retail" because the market for the innovative product "could accommodate two or more producers"). The intellectual separation between intellectual property and natural monopolies is also maintained in economic thought. See, for example, Viscusi, Vernon, and Harrington, *Economics of Regulation* at 351-72, 831-46 (cited in note 9).

A “natural monopoly” is said to be present in any market where the average cost of providing a good continues to decline throughout the relevant range of demand.¹⁵ Such “declining average cost” conditions commonly arise where the fixed costs averaged over each unit of production remain relatively large compared to marginal cost throughout the range of market demand.¹⁶ For example, production of electricity has frequently been considered one example of a declining average cost industry because an efficient electrical plant requires large capital expenditures but, once such a plant is built, the marginal cost of producing electricity is relatively small.

There are two important implications of declining average costs. First, the classic condition of perfectly competitive markets—a market price at marginal cost—is impossible to achieve as a long-run equilibrium without some sort of governmental subsidy. The reason for this result is that, if the market price of the good were driven to marginal cost, producers would be unable to recover their fixed costs and they would not enter the industry in the first place. A second corollary of declining average costs is that concentrating all production in a single firm is more efficient than having multiple firms undertake production.¹⁷ Such concentration allows the firm to realize an economy of scale by spreading the fixed costs over more units of production and avoids wasteful duplication of the fixed costs of production.

Intellectual property is a special case of a good with declining average cost. The fixed costs of producing the intellectual property are the costs of writing a book, filming a movie, or researching and developing an innovation. Once the intellectual property has been created, the marginal cost of using it an additional time is very low; in fact, in most cases, it is essentially zero. The zero marginal cost of copyrighted works is easy to see in the modern world where photocopiers, computers, and VCRs are ubiquitous. For inventions, the intellectual property covered by a patent is often labeled as a “non-rivalrous” good: It can be used without being consumed. But the concept of non-rivalry is identical to zero marginal cost, for we could just as easily imagine that each use does consume—that is, destroy—a unit of intellectual property but that another unit is instantaneously produced at zero cost.

Because intellectual property is subject to declining average costs, it is also subject to the two effects discussed above. Indeed, these effects are

¹⁵ Formally, the concept of “subadditivity” is used to define natural monopoly, but declining average cost is a sufficient condition for the existence of a natural monopoly. See Viscusi, Vernon, and Harrington, *Economics of Regulation* at 355 (cited in note 9).

¹⁶ See Richard A. Posner, *Economic Analysis of Law* § 12.1 at 361–62 (Aspen 6th ed 2003).

¹⁷ This point follows directly from the assumption that average costs decline throughout the entire range of demand. The total cost of satisfying the demand (that is, the sum of each firm’s average cost times the quantity produced by the firm) will be minimized by having all the production undertaken by one large firm, which will have lower costs than smaller firms.

familiar. First, a market price at marginal cost is not a long-run equilibrium solution without some sort of governmental subsidy. Marginal cost pricing for intellectual property could be achieved by, for example, refusing to grant exclusive legal rights. As in the case of other natural monopolies, however, that policy would mean that producers would not be able to recover their fixed costs and thus would not produce the property in the first place. The second effect also holds: By concentrating production of an intellectual property good in a single firm, that firm is able to realize an economy of scale by spreading the fixed costs over more units of production. Thus, as in the case of a natural monopoly, having only one producer of each particular piece of intellectual property avoids wasteful duplication of fixed costs.¹⁸

II. SUBSIDIZED MARGINAL COST PRICING FOR INTELLECTUAL PROPERTY: OLD PROBLEMS AND NEW VARIATIONS

Hotelling's marginal cost thesis is most clearly restated in *Rewards versus Intellectual Property Rights* by Steven Shavell and Tanguy van Ypersele.¹⁹ Like Hotelling, Shavell and van Ypersele argue in favor of a system of public subsidies to cover the fixed costs of several major industries. These subsidies would come in the form of rewards for intellectual property production rather than as payments to cover the fixed costs of public utilities. But in all other respects, the proposals broadly parallel each other. In both, the payment of fixed costs comes from general government revenues and would, if fully implemented, require significant government expenditures. And in both, the goal of the system is to drive price down to marginal cost across a broad range of industries. Hotelling wanted to achieve marginal cost pricing for the products of "electric power plants, waterworks, railroad, and other industries in which the fixed costs are large."²⁰ Shavell and van Ypersele target "drugs . . . , all computer software . . . , and electronically recorded materials."²¹ Different industries have been chosen, but the tools and goals are the same. As shown in

¹⁸ I leave for later discussion the issue of *degree of monopoly*. The recent literature has generally described intellectual property rights as conferring "monopoly power." See text accompanying note 57. To a certain extent, that description is always accurate and, for purposes of elucidating the basic analogy here, I indulge it. However, as discussed below in Part III.D, the degree of monopoly conferred by intellectual property rights is often far less than that considered to warrant concern in other areas of the economy.

¹⁹ Shavell and van Ypersele, 44 *J L & Econ* 525 (cited in note 12). As the authors noted, *id* at 528 n 10, their proposal follows the suggestion made much earlier by Kenneth Arrow, who argued in favor of having "the government or some other agency . . . finance research and invention." Kenneth J. Arrow, *Economic Welfare and the Allocation of Resources for Invention*, in National Bureau of Economic Research, *The Rate and Direction of Inventive Activity* 609, 623 (Princeton 1962).

²⁰ Hotelling, 6 *Econometrica* at 242 (cited in note 1).

²¹ Shavell and van Ypersele, 44 *J L & Econ* at 545 (cited in note 12).

Part A below, the objections to this proposal are the same as those advanced by Coase more than a half century ago.

The recent literature also includes some innovative proposals for administering a public subsidy scheme. As shown in Part B below, these creative schemes are designed to address one point in the Coasean critique, but even on that point they are not fully satisfying.

A. Restating Coase for Intellectual Property

Coase identified four basic problems with Hotelling's subsidy proposal; each persists in the setting of intellectual property.

1. Tax distortions.

The most obvious objection to Hotelling's proposal is that the government must impose taxes to fund the subsidies for marginal cost pricing and that those taxes could "produce results similar in character to those which follow from charging [prices] greater than marginal cost."²² Shavell and van Ypersele do not entirely ignore this point; they note that their proposed rewards will have to be funded through taxation, which has its own "distortionary cost."²³ "Hence," they acknowledge, "the potential case for reward is less strong than is suggested by our analysis."²⁴

Any serious proposal to institute a system of rewards would need to compare the distortionary effects of taxes and IP rights and to conclude that the tax distortions were smaller than those caused by the relevant class of IP rights. Otherwise, the same objection made by Coase more than half a century ago would apply: The marginal cost solution could "bring about . . . a loss similar to that which the scheme was designed to avoid, but arising out of the effects of increased income taxes."²⁵ As will be discussed in Part III.D, there are good reasons to think that the monopoly distortions from most IP rights are generally not large in comparison to those caused by taxation and that they are smaller than those that would trigger concern in other areas of the economy.

2. Government ignorance: false demand and the misallocation of resources.

One of Coase's most important insights is that, unless the government has very good information (and the will to use it), subsidized marginal cost pricing can lead to a misallocation of resources. An easy example is where the government subsidizes property that then goes unused. But even if the property is used—indeed even if used heavily—the sub-

²² Coase, 13 *Economica* at 179 (cited in note 4).

²³ Shavell and van Ypersele, 44 *J L & Econ* at 544 (cited in note 12).

²⁴ *Id.*

²⁵ Coase, 13 *Economica* at 180 (cited in note 4).

sidy scheme can still lead to misallocation because consumers can commit themselves to strategies creating demand for the subsidized good. The example Coase provides is where consumers choose a location to live knowing the government subsidizes the fixed costs of transportation. In such circumstances, consumers may choose to live too far from the city center because they will assume that they will have to pay only the marginal costs of transportation. In sum, they will “choose between different locations without taking into account that the costs of carriage vary between one location and another.”²⁶

A subsidized marginal cost pricing scheme can account for this problem *only if* the government has sufficient information. Even though the government would subsidize fixed costs so that consumers are charged only marginal cost, the government’s decision to provide the subsidy should be based on whether consumers, as a whole, would have demanded the good *if they had to pay the total cost*.²⁷ The easiest example is where the members of a community would be willing to pay the marginal costs of a commuter train between their location and the city center. Should the government subsidize the fixed costs of train service? The answer is clearly no if the total benefits of the train service (that is, the sum of all benefits to all consumers) would not cover the total cost of providing the service.

The harder issue is presented where the *current* demand for service does exceed the total costs of providing the service, but that demand for service would not have been so high (because fewer people would live at the location) if the consumers had expected to pay the full costs of service prior to choosing their residences. The difficulty here is that, once the consumers have settled on a residence, their demand for transportation will appear to be real and, collectively, that demand may exceed the total costs of the train service. But the demand is in fact a false demand. Before the consumers located themselves in the hinterlands, their collective demand might not have exceeded total costs because, at that time, the consumers could have chosen to live closer. Thus, in assessing whether the demand exceeds the total costs of service, the government must be able to take into account the distortionary effects of its subsidies. In other words, it must be able to answer the question whether consumers, as a whole, would have demanded the good *if government policy were different and they had expected to pay the full cost of the product*. But, of course, the government will have no data to answer that question because consumers are not paying full costs and never expected to do so. And yet, if the government cannot accurately answer that question, then consumers will

²⁶ Id at 174.

²⁷ See id at 174–76.

have incentives to make decisions (for example, where to live) inefficiently and resources will be misallocated.

The parallel to intellectual property is straightforward. Just as consumers can make decisions that create demand for transportation, so too they make decisions that create demand for intellectual property. For example, consider a firm faced with a decision whether to computerize a certain aspect of its business. The switch to computers will save the firm labor costs, which the government does not subsidize, but increase the firm's demand for software and computer innovations, which the government does subsidize. In making its decision, the firm will not take into account the full costs of the intellectual property needed for computerizing the task and will substitute computers for labor at an inefficient rate.

Shavell and van Ypersele do not totally ignore this problem; rather, they assume the problem away by making an assumption about the government's information strikingly similar to that made by the marginal cost theorists sixty years ago. They assume that the government will offer rewards only for inventions with positive social surplus.²⁸ This assumption requires, as they recognize, that "the government's information [be] good enough to screen out innovations with no value (or with no expected value)."²⁹ As used in this context, inventions with "no value" include not only inventions with no benefit (such as a "perpetual motion machine" or a worthless variation of existing technology), but all inventions where the total demand for the invention does not justify its creation. The government must, therefore, have very good information about the demand for intellectual property even though, in the marketplace, consumers are never asked to pay the full costs of intellectual property.

3. Income redistribution and rent-seeking.

Another aspect of Hotelling's marginal cost proposal is that the system would redistribute income in favor of those who consume declining average cost goods.³⁰ This effect occurs because the revenue to cover fixed costs is derived from general taxation. Indeed, this feature is essential to the goal of the scheme because, if only the consumers of the relevant product were made to bear the tax that finances the subsidies, then those consumers would be bearing the *total* cost of the product, rather than just the *marginal* cost.

Such a wealth transfer could be criticized on distributional and fairness grounds. Why, for example, should citizens who do not consume large amounts of intellectual property subsidize those who do? But there is also an efficiency objection. While wealth transfers themselves do not

²⁸ Shavell and van Ypersele, 44 J L & Econ at 532 (cited in note 12).

²⁹ Id at 532 n 24.

³⁰ See Coase, 13 *Economica* at 176 (cited in note 4).

necessarily have any cost in terms of efficiency, they do where individuals are likely to expend resources seeking the transfer. The concern here is about rent-seeking. It can be understood most clearly by considering the appeal of a regime that promises, as Shavell and van Ypersele's reward system does, to make "drugs . . . far cheaper," "computer software . . . free," and "electronically recorded materials . . . inexpensive."³¹ That regime will appeal most strongly to those who *currently* consume those goods, for they will obtain the largest benefit. But the economic efficiency of a reward system comes exclusively from increasing consumption among those consumers who value the good (or some units of the good) *below* the price that would be charged by the right holder under the current IP system. In short, the increase in efficiency comes only from consumers who are literally at the very margin of the demand curve. But the political pressure to adopt the system will come mainly from the inframarginal consumers, who have more to gain from the system even though their gains are mere wealth transfers from general government revenues.

Indeed, the rent-seeking problem is even worse in the experimental system proposed by Shavell and van Ypersele because it would implement a reward system on only a "partial basis" with application only to those "areas of innovation where the social losses due to intellectual property are likely to be high, namely, where the difference between price and production cost (after innovation) is large."³² If reward subsidies are targeted to particular areas, the opportunities for rent-seeking are increased dramatically, for the current consumers of particular intellectual property products will expend resources vying to have their area picked as the target for the subsidy.

4. Private alternatives: price discrimination and "multi-part" pricing.

Coase's final criticism of Hotelling's proposal was that Hotelling was not making the correct comparison: He was comparing marginal cost pricing (coupled with the necessary government subsidies) to a single pricing scheme. But monopolists are free to rely on "multi-part" pricing, by which lower charges would be made for incremental units.³³ In other words, the monopolist could engage in price discrimination—charging more for

³¹ Shavell and van Ypersele, 44 *J L & Econ* at 541–42 (cited in note 12).

³² *Id.* at 545. Moreover, the relevant economic question for targeting rewards should not be whether the difference between price and production cost is large—though that question is likely to dominate the political choice of whether to apply a reward subsidy. The right question is whether a large amount of additional demand would be met if a reward policy were implemented.

³³ Coase, 13 *Economica* at 174 (cited in note 4). Coase's later article, *The Lighthouse in Economics*, 17 *J L & Econ* 357 (1974), showed precisely how private business had previously used multi-part tariffs to decrease the deadweight loss in the lighthouse industry. See *id.* at 364–65.

some units of the good than for others. If the monopolist can engage in perfect price discrimination, no deadweight loss will occur.

Intellectual property right holders often try some form of price discrimination, which may reduce the deadweight loss associated with their exclusive rights. The reason they do so is not altruism. Right holders have good private incentives to find ways to minimize deadweight loss because, to the extent that they can achieve this, they may be able to capture part of the gains. But the effect of this privately motivated behavior is to reduce the distortionary effect of the exclusive right.

The point here is similar to that made in the above discussion of taxation. A reward system cannot be compared to IP rights without comparing the distortionary effects of patents and taxes. Indeed, the general issue here can be stated as simply this: Between the government and the IP right holder, who can collect the revenue needed to pay the fixed costs of creating the IP with the least distortion? The government has the coercive power to tax, including the power to use different tax rates for different categories of individuals. The IP right holder has the power to charge for the intellectual property, including the right to charge different prices to different categories of customers. Given that the IP right holder also has the potential constraint of competition from other technology, it is by no means clear that the IP right holder will cause greater distortions than the government's revenue agents.

One additional reason militates against funding fixed costs through general taxation. If left to recover the fixed costs of innovation through its pricing structure, the IP right holder will have an incentive to improve the business technology of minimizing deadweight loss.³⁴ Such business improvements will improve the incentives for innovation generally, by making patents a more efficient technology.³⁵

B. Tinkering with the Machinery of Subsidy: Refining Rewards

While Shavell and van Ypersele restate Hotelling's marginal cost thesis, two other articles have offered more refined mechanisms by which social subsidies can be used to drive the price of intellectual property toward marginal cost. In general, these refinements are directed toward solving one of the largest problems associated with any subsidy scheme:

³⁴ And, of course, a new technology in business methods would be patentable. See *State Street Bank & Trust Co v Signature Financial Group, Inc.*, 149 F3d 1368, 1375 (Fed Cir 1998).

³⁵ Of course, if the government funded the fixed costs of innovation through tax revenue, that would increase the incentives for the government to improve the efficiency of its tax system. But the government already has good incentives to improve taxation techniques. Moreover, the private sector can probably outstrip the government in improving the technology of deadweight loss minimization. Indeed, one assumption of any reward system must be that government is inferior to private industry in innovating, for otherwise public financing of government research would be preferable to a reward system. See Kremer, 113 Q J Econ at 1143 (cited in note 12) (assuming that government financing of research is ineffective).

the poor quality of the government's information. These articles do not reconsider the general project of subsidized marginal cost pricing in intellectual property and thus are subject to many of the same criticisms that can be made against the Shavell and van Ypersele proposal. But the refinements are nonetheless worth examining for two reasons. First, the refinements, while clever, suffer from some flaws that may not be immediately obvious. Second, to the extent that these refinements are worth pursuing, they should not be limited to the field of intellectual property but instead considered more generally for solving the divergence between price and marginal cost in other fields.

1. Striving for smarter government.

The first of the two articles, Michael Kremer's *Patent Buyouts: A Mechanism for Encouraging Innovation*,³⁶ proposes an interesting auction system to solve the problem of government ignorance about the value of an invention. Rather than trying to value innovations itself, the government would hold auctions for patents and thereby allow private bidders to establish the price for each innovation. Of course, while auctioning might be a good valuation mechanism, transferring a patent from one private party to another does nothing to solve the marginal cost problem. The trick to Kremer's system is that, after the auction is complete, the government steps in and purchases most of the patents that have been auctioned. Of course, the government cannot use this mechanism to buy out *all* of the patents auctioned because, if it did, no private party would have an incentive to develop the information necessary to bid in the auction. Thus, some patents are simply transferred from one private party to another, with no solution to the marginal cost problem for those properties.

The Kremer buyout mechanism has some nice features. Obviously, it substitutes a market mechanism for the governmental welfare calculator necessary to run a rewards system. To the extent that private firms have better information than the government about the value of innovations, that substitution is desirable.³⁷ Kremer's proposal also gives the patentee

³⁶ 113 Q J Econ 1137 (cited in note 12).

³⁷ Although Kremer proposes government-run auctions to provide market-based valuations for patents, such auctions would be unnecessary for patents held by publicly traded firms. In place of an auction, the government could simply (1) suspend trading in the firm's stock; (2) declare the patent to be in the public domain; (3) allow trading in the stock to resume; and (4) observe the difference between the pre- and post-suspension market prices of the firm's stock. The stock price difference would provide a market-based test of the patent's value, without the cost of holding an auction. If the government paid that difference to the shareholders of record at the time of the suspension in trading, incentives to underwrite research would not be dulled. As in Kremer's system, a stock market system for valuing patents would need certain controls to prevent collusive tactics, and the government would have to leave some patents in private hands so that market valuations remain honest. The government could also add a "markup" to increase the incentives for innovation, though only

control over the timing of the auction, and this feature might allow patents to continue to serve what is known in intellectual property literature as a “prospect function”: A patentee with an embryonic patent can refuse to submit the patent to auction until the property has been sufficiently developed; the property right can therefore continue to provide an incentive to invest in the further development of the idea.³⁸

There are, however, three especially difficult aspects of the proposal. First, to keep the auction prices fair, Kremer’s system requires a randomly selected set of patents to be sold to private parties, and thus the government must have the political will to continue enforcing that set of patents even though most innovations are free. This feature would be most problematic in the pharmaceutical industry, which Kremer identifies as a “natural area to try” his buyout mechanism. A buyout system would yield the greatest social benefits for those drugs having the largest difference between marginal cost and monopoly pricing, and these drugs are likely to be life-saving drugs with few good substitutes. Yet the assignment between the public and private domains must remain strictly random. The government must be willing to allow the cure for AIDS to remain in private hands if random chance would have it. Nor is it a solution to this problem to say that the government can always subsidize drugs that remain under patent, for, if that is so, then the government’s commitment to subsidize will distort the auction prices by raising them beyond their social value.

A second problem concerns patents that are substitutes or complements of each other. As Kremer recognizes, sequential auctions of substitute or complementary patents could distort the bid prices for the patents in a way that causes either insufficient (in the case of substitutes) or excessive (for complements) levels of research. For example, if the first of two complementary patents were placed in the public domain, the bidders on the second patent would recognize that the public will be willing to pay more for use of the second patent because the first can be used for free. Kremer’s solution is to require that all substitute and complementary patents be auctioned simultaneously.³⁹ However, one large class of complementary patents—improvement patents—tend to be sequential,

a small markup would be needed to achieve Kremer’s goal of doubling the incentives for innovation.

³⁸ See generally Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J L & Econ 265 (1977) (arguing that patents on embryonic ideas serve a “prospect function” because they encourage their owners to invest in the further development of the idea). It is a separate issue whether, under Kremer’s system, a patentee would have an incentive to delay the auction so that the patent could serve its prospect function. Bidders in the auction would value the patent based on the assumption that it would remain private property because they would be required to make good on their bids only if the patent were not going to be placed in the public domain. But the whole thrust of the prospect theory is that the rights to an innovation may be worth more in private hands than in the public domain.

³⁹ Kremer, 113 Q J Econ at 1156–57 (cited in note 12).

which makes simultaneous auctions difficult. Indeed, in an earlier part of his article, Kremer recognizes the sequential nature of improvement patents and counts as one benefit of his system that “[p]atent buyouts will strengthen incentives for this further development [of technology in related fields] . . . because the market for a complementary invention will be larger if the original invention is sold at marginal cost.”⁴⁰ That passage assumes that the patent on the original invention will be auctioned separately from the later complementary patent even though, as Kremer later recognizes, such a separate auction may create excessive incentives for research into complements.

The problem of patented substitutes and complements is, however, only a special manifestation of the more general distortion caused by the subsidy. Subsidizing patents can distort the market price (in other words, the auction price) for a patented substitute or complement not because the substitute or complement is patented, but merely because it is a substitute or complement. This third and final difficulty with Kremer’s buy-out proposal is in fact just a recapitulation of one point in Coase’s critique of Hotelling—that the social subsidies needed to produce marginal cost pricing can create resource misallocations of their own. Consider, for example, a patent that decreases the cost of transportation; complements to that patent include not only improvements to that particular technology but also homes built far from a city center. If the homes and the patent are not auctioned together, parties will bid up the price of homes (and, more importantly, build more homes) in anticipation that the patented technology is likely to be subsidized. The result is the same as if the complements were both patents: The subsidies can create excessive incentives for creating the complements (and also insufficient incentives to create substitutes, such as homes in the city).

While Kremer recognizes the problem of substitute and complementary patents and tries to construct his auction mechanism so that the auction prices of patents are not distorted by the social subsidy system, he does not recognize that investments in patents are only one particular type of capital investment that may suffer distortions caused by the subsidies. The problem is general, and the solutions proposed by Kremer for substitute and complementary patents—for example, simultaneous auctions—cannot realistically be extended over the full range of all substitutes and complements for a patented technology.

2. Hoping for a dumber private sector.

In *Perfecting Patent Prizes*, Michael Abramowicz proposes an alternative way to refine social subsidies for intellectual property.⁴¹ Like

⁴⁰ Id at 1152.

⁴¹ Abramowicz, 56 Vand L Rev 115 (cited in note 12).

Kremer, Abramowicz proposes an interesting solution to the problem of government ignorance but, rather than trying to make the government's information better, Abramowicz suggests making the private parties' information worse. Abramowicz's insight is that "flawed governmental decisionmaking in awarding prizes . . . [is] of concern only if the government's biases are predictable in advance."⁴² If a government agency is charged with rewarding meritorious activity and private parties have very poor information about how the government will grant these rewards, then the private parties may assume that all deviations from the stated goal of rewarding merit will be just random and unpredictable noise. Because private parties will respond to the expected (that is, average) reward and because government errors will (by hypothesis) average to zero, private parties will behave as if the government rewarded only the desirable behavior. The trick, then, under Abramowicz's system, is to inform private parties of the goals of the reward system but otherwise to keep them as ignorant as possible about its details.⁴³ Thus, Abramowicz suggests that Congress should authorize an agency to grant rewards for any "action to reduce the deadweight cost of patents," but that the rewards should be conferred only long after the relevant action, so that the structure, processes, and composition of the agency remain mysteries to the parties at the time they are taking the actions justifying the reward.⁴⁴

The first point to notice about Abramowicz's system is that there is no need to limit the proposal to rewards for "reduc[ing] the deadweight cost of patents." Techniques for reducing deadweight loss may be public goods, but so too are innovations. If Abramowicz's delayed reward system works, it can be used not to supplement but to supplant the patent system; the meritorious behavior targeted for rewards would be innovation itself rather than reduction of deadweight loss. Indeed, it could also be applied to other fields of natural monopoly or even to government procurement.

The question then becomes not why has a delayed reward system not been applied to minimizing the deadweight loss from patents, but why has such a system not been applied more generally to encourage conduct that the government is willing to subsidize. At least one partial answer may be that government decisionmakers—particularly decisionmakers unconstrained by any rules or by any criteria for evaluation—tend to have one bias that is predictable and hard to eliminate: Those decisionmakers tend

⁴² *Id.* at 218.

⁴³ At times, Abramowicz frames his proposal as a plea for "flexibility." Thus, for example, he champions "agency flexibility" in part because "it would allow different approaches to reducing deadweight loss to be used in different circumstances." *Id.* at 219. But in fact his proposal requires not only agency flexibility but also agency unpredictability. If the agency were merely flexible—that is, if it could choose amongst a variety of approaches to fit particular circumstances but its choices were predictable—then private parties would know the agency's biases.

⁴⁴ *Id.* at 212.

to be influenced by lobbying. If that is a significant problem, then the rights to prizes would be little more than licenses to lobby; they would not be worth much and few people would invest much in the activity needed to create the claim. Rather, parties would invest heavily in swaying the governmental decisionmakers.

Indeed, while Abramowicz calls for a “pilot program” in which an agency has “a great deal of flexibility” in granting rewards, there is in fact already experience with such a program. In 1991, the Federal Communications Commission—an administrative agency that, consistent with Abramowicz’s suggestions, is both independent and relatively unconstrained by statute—began an experiment known as the “pioneer preference program.”⁴⁵ The program was intended to “reward[] those who develop new frequency-based services” and to “encourag[e] entrepreneurs and venture capitalists to invest time and money in new services and any related technologies.”⁴⁶ The rewards for innovation would be licenses to valuable spectrum, and the Commission retained flexibility as to how it would ultimately grant these rewards. Within a few years, the program became controversial because of the enormous lobbying efforts of firms seeking rewards,⁴⁷ and in 1997, Congress barred the agency from continuing the program.⁴⁸

Of course, one such failure does not prove the impossibility of constructing a governmental reward system for which “the best way to obtain a claim on a prize is through actual scientific research, rather than through lobbying.”⁴⁹ But it does suggest that patent prizes may be difficult to perfect.

⁴⁵ See *In the Matter of Establishment of Procedures to Provide a Preference to Applicants Proposing an Allocation for New Services*, 6 FCC Rec 3488, 3498 (1991).

⁴⁶ *In the Matter of the Establishment of Procedures to Provide a Preference to Applicants Proposing an Allocation for New Services*, Notice of Proposed Rule Making, 5 FCC Rec 2766, 2766–67 (1990).

⁴⁷ See *In the Matter of Review of the Pioneer’s Preference Rules and In the Matter of Amendment of the Commission’s Rules to Establish New Personal Communications Services*, 9 FCC Rec 4055, 4064 (1994) (reviewing the propriety of the extensive lobbying efforts by candidates for pioneer preference rewards). See also Sandra Sugawara, *FCC Faces Probe on Award of Wireless Phone Rights*; *4 PCS Firms Deny ‘Pressure’ for Licenses*, Wash Post B11 (May 5, 1994) (noting a congressional inquiry into whether “the agency’s decision to grant so-called ‘pioneer preference’ status to [four] companies was the result of ‘political and lobbying pressure’”).

⁴⁸ Balanced Budget Act of 1997 § 3002, Pub L No 105-33, 111 Stat 251, 259, codified at 47 USC § 309(j)(13)(F) (2000). See also Federal Communications Commission, *Pioneer’s Preference Rules*, 62 Fed Reg 48951, 48951–52 (1997) (amending 47 CFR §§ 0.241, 1.402, and 5.207 by repealing authority to continue the pioneer preference program); John F. Duffy, *The FCC and the Patent System: Progressive Ideals, Jacksonian Realism, and the Technology of Regulation*, 71 U Colo L Rev 1071, 1142–45 (2000) (describing the failure of the pioneer preference program).

⁴⁹ Abramowicz, 56 Vand L Rev at 213 (cited in note 12).

III. DIFFERENCES BETWEEN INTELLECTUAL PROPERTY AND TRADITIONAL NATURAL MONOPOLIES

Because the current literature on marginal cost pricing in intellectual property has ignored the marginal cost controversy of the twentieth century, it has not attempted to make the case that intellectual property is so different from other natural monopoly industries that the government should embrace a solution that has been generally rejected outside of intellectual property. Here we examine that issue and find that, although the fundamental analysis of subsidized marginal cost pricing is the same in intellectual property as in more traditional natural monopolies, there are some differences worth noting. The differences, however, cut in opposite directions and do not establish a clear case for why intellectual property in particular should be a better target for subsidized marginal cost pricing.

A. Increasing the Incentives for Innovation

One argument that appears, at first blush, to be unique to the setting of IP is that social subsidies should be preferred over private rights because social subsidies can be used to increase the incentives for investment in IP. For example, Shavell and van Ypersele argue that “the incentive to invest is always inadequate [in an IP patent system] because monopoly profits are less than social surplus,” but that a reward system need not be “systematically inadequate” in the same way.⁵⁰ This argument is not, however, limited to the context of intellectual property. As the champions of Hotelling’s thesis noted, the incentives to invest in declining-cost industries are generally inadequate under a “Coase-plan,” or private-rights system, because, just as in the IP case, private profits are less than the social surplus if perfect price discrimination is impossible.⁵¹ Thus, in the traditional monopoly case, private firms may have “systematically inadequate” incentives to invest in a declining-cost industry.

In fact, in the context of intellectual property, there is a good reason to keep the incentives to innovate below the full social surplus of the innovation. As Shavell and van Ypersele note, holding out an incentive to invent (either a reward or a patent) creates “a race among potential innovators to be the first to innovate,” and “this race leads to the possibility of overinvestment in research because the private return to being first may

⁵⁰ Shavell and van Ypersele, 44 *J L & Econ* at 530 (cited in note 12). See also Kremer, 113 *Q J Econ* at 1148 (cited in note 12) (arguing that a patent buyout mechanism should include a “markup” that would “raise private incentives for original research closer to the social benefit created by the invention”).

⁵¹ William Vickrey, *Some Objections to Marginal-Cost Pricing*, 56 *J Polit Econ* 218, 226 (1948) (arguing that private, unsubsidized decisionmakers will fail to fund many socially worthwhile projects in declining-cost industries).

exceed its social value.”⁵² Although Shavell and van Ypersele conclude that this racing effect is not important to the choice between rewards and IP rights,⁵³ the racing effect means that an IP reward cannot be deemed inadequate merely because it is less than the full social surplus of the innovation. Indeed, it can be shown that, in any innovation system that rewards the first innovator, setting the reward equal to the full social surplus of the invention is clearly *not* efficient because competition among inventors will dissipate all of the social surplus.⁵⁴ An IP reward system that sets the reward equal to the full social surplus would plainly offer inefficiently large incentives.

B. The Administration of Marginal Cost Pricing: Price Regulation versus Withdrawal of Property Rights

Intellectual property differs from traditional natural monopolies in one respect that does make the case for subsidized marginal cost pricing somewhat stronger: Once the fixed costs of creating intellectual property have been subsidized, the government has an administratively simple way to enforce marginal cost pricing; it simply places the property into the public domain. By contrast, even if the government covers all fixed costs associated with a traditional natural monopoly, the government must still administer a system of price regulation to keep the monopolist from pricing above marginal cost, and that task may be quite difficult.⁵⁵ This difference is, of course, a corollary of intellectual property’s zero marginal cost. Holding price at zero requires not a complicated scheme of price regulation, but only a withdrawal of property rights protection.

This difference does, however, come with a cost: While the nature of intellectual property simplifies the government’s regulatory task after creation of the property, it also makes the job on the front end—that is, the setting of the subsidy—more difficult. To determine whether it is setting correct subsidies, the government needs to obtain some idea of the social value of the properties subsidized, and measuring demand is typically one step in that process. Yet it may be a much simpler matter to tell how many cars cross a bridge or how much electricity is consumed than to determine how often an idea is used. To an extent, Shavell and van

⁵² Shavell and van Ypersele, 44 *J L & Econ* at 543 (cited in note 12).

⁵³ *Id.* (“Because the race to be first is a factor that afflicts both systems, and because the information needed to address it under either seems to be of the same character, consideration of the race to be first does not seem to bear on the comparison between reward and patent.”).

⁵⁴ See Yoram Barzel, *Optimal Timing of Innovations*, 50 *Rev Econ & Stat* 348, 348–49 (1968). See also Nancy Gallini and Suzanne Scotchmer, *Intellectual Property: When Is It the Best Incentive System?*, in Adam B. Jaffee, Josh Lerner, and Scott Stern, eds, *2 Innovation Policy and the Economy* 51, 73 n 5 (MIT 2002) (noting that Kremer’s patent buyout mechanism would provide excessive incentives for innovation if inventors were rewarded with the full social value of the innovation).

⁵⁵ See Vickrey, 56 *J Polit Econ* at 232–35 (cited in note 51) (detailing the problems associated with calculating marginal cost for non-IP natural monopolies).

Ypersele recognize this difficulty, for they acknowledge that the administration of a reward system is “more difficult when the value of an innovation is in part that it leads to subsequent innovations.”⁵⁶ But the question whether an innovation has been used in creating subsequent innovations is only one dimension of the problem of defining a patent’s “scope,” which also encompasses the more general question whether the relevant innovation can fairly be deemed to be used in producing the host of various products appearing on the market. Answering that question is notoriously difficult, and the withdrawal of property rights would make it even more so because private parties would no longer have good incentives to meter the use of the idea.

C. Local versus Global

Unlike a cable network, a bridge, a utility, or other traditional natural monopoly, each piece of intellectual property typically satisfies demand across a worldwide market. This difference almost certainly complicates any pure subsidy scheme because the problem of providing the efficient subsidy (or reward) must be solved not by one government but by many, each of which has incentives to behave strategically in contributing toward the reward.

This feature of intellectual property may, however, be less relevant for optional systems of the sort proposed by Shavell and van Ypersele. Under their proposal, the innovator is allowed to choose between a reward and IP rights within the country. This model assumes a preexisting system of property rights that divides IP rights along national lines and thereby transforms a global public good into a local one. Indeed, a multinational, optional reward system can be viewed as simply changing the market for IP—allowing the right holder to sell the innovation to countries as well as to individuals. Deadweight loss can theoretically be eliminated, but only if the IP right holder is able to practice perfect price discrimination among countries. If such price discrimination is not possible, then deadweight loss will persist as some countries will find the price charged for the IP rights to be above the reward that they are willing to offer.

D. The Degree of “Monopoly”

The recent literature on the marginal cost problem in intellectual property tends to describe IP rights as conferring “monopoly power” or as leading to “monopoly pricing.”⁵⁷ In one sense, all IP rights are “mo-

⁵⁶ Shavell and van Ypersele, 44 *J L & Econ* at 543 (cited in note 12).

⁵⁷ *Id.* at 529 (noting that “[u]nder the patent system, the innovator’s incentive to invest in research is the monopoly profits he would earn”); Kremer, 113 *Q J Econ* at 1137–38 (cited in note 12) (describing the patent system as creating “monopoly price distortions”). See also Ian Ayres and Paul

nopolies” because one accepted definition of “monopoly” is “an exclusive privilege of engaging in a particular business or providing a service, granted by a ruler or the state.”⁵⁸ But this is purely a semantic point. For purposes of public policy, the relevant concept must be an economic one, and the economic concept of monopoly is a matter of degree, not an all-or-nothing proposition. Moreover, defining the degree of monopoly or market power implicates a notorious ambiguity in economics—the definition of a market, which “remains unavoidably a matter of judgement in some degree.”⁵⁹ The judgments made in defining markets and monopoly are ultimately pragmatic ones. They are based on a sense of whether the distortions produced in the market should be a matter of concern, and that judgment, in turn, is based on the sense of the likely success of governmental intervention.

Thus, while the recent literature advocating social subsidies for intellectual property focuses on the undeniable divergence between price and marginal cost caused by intellectual property rights,⁶⁰ the relevant questions for formulating a governmental response should be whether, and to what extent, that divergence should be a matter of concern. Here there is good reason to believe that the divergence is usually not a matter of concern, or at least that it does not rise to the level that would create concern in other areas of the economy. Indeed, the U.S. Antitrust Guidelines for licensing intellectual property explicitly state that the government “will not presume that a patent, copyright, or trade secret necessarily confers market power upon its owner.”⁶¹ The Guidelines recognize that “[a]lthough the intellectual property right confers the power to exclude with respect to the specific product, process, or work in question, there will often be sufficient actual or potential close substitutes for such product, process, or work to prevent the exercise of market power.”⁶² Com-

Klemperer, *Limiting Patentees' Market Power without Reducing Innovation Incentives: The Perverse Benefits of Uncertainty and Non-injunctive Remedies*, 97 Mich L Rev 985, 987 (1999) (“Legal scholars have failed to appreciate that unconstrained monopoly pricing is not a cost-justified means of rewarding patentees.”).

⁵⁸ See *Webster's New Twentieth Century Dictionary* (Simon and Schuster 2d ed 1983) (definition 2).

⁵⁹ See William G. Shepherd, *Market Share*, in John Eatwell, Murray Milgate, and Peter K. Newman, eds, 3 *The New Palgrave: A Dictionary of Economics* 335, 336 (Macmillan 1998).

⁶⁰ See Mark A. Lemley, *The Economics of Improvement in Intellectual Property Law*, 75 Tex L Rev 989, 996 (1997):

[I]ntellectual property rights . . . allow the intellectual property owner to raise the price of that work above the marginal cost of reproducing it. Indeed, intellectual property rights must permit prices to rise above marginal cost in some cases if they are to have their intended effect of providing an incentive to create.

⁶¹ U.S. Department of Justice and Federal Trade Commission, *Antitrust Guidelines for the Licensing of Intellectual Property* § 2.2 (1995), online at <http://www.usdoj.gov/atr/public/guidelines/ipguide.htm#t22> (visited Nov 24, 2003).

⁶² *Id.*

mentators also have recognized that intellectual property rights do not “automatically confer market power or create ‘monopolies’ in an economic or antitrust sense.”⁶³ If this is so, then the distortionary effects caused by IP rights might generally be small or, more accurately, small in comparison to the expected distortionary cost of the taxes needed to fund a social subsidy scheme.

CONCLUSION

Despite its flaws, the developing literature advocating public subsidies to achieve marginal cost pricing of intellectual property has provided scholars with an opportunity to return to one of the fundamental debates in economics theory from the twentieth century. The debate has now shifted from railroads and electric utility plants to pharmaceuticals and software, but the underlying economic issues are similar. This Essay has suggested that this new scholarship would be better if it acknowledged the similarity between the marginal cost controversy of today and that of the past. Such an acknowledgment is important because, if the new literature can provide an answer to the marginal cost problem in the field of intellectual property, that answer is likely to apply to a broad range of industries.

More generally, however, this new marginal cost controversy should be welcomed. Revisiting fundamental debates always holds out the possibility of fresh insight, and we should not be Pollyannish about our current system of intellectual property. That system is itself an experiment no more than a half millennium old, and it continues to evolve. The champions of intellectual property should not become Luddites when it comes to improving the legal technology of encouraging creativity. Still, we can hope that regulatory innovators will proceed with a full understanding of the scope of the problem and an appreciation of the ideas of the past.

⁶³ Lemley, 75 *Tex L Rev* at 996 n 26 (cited in note 60). See also Edmund W. Kitch, *Patents: Monopolies or Property Rights?*, 8 *Rsrch L & Econ* 31 (1986) (arguing that, even in the case of Xerox’s patents on photocopying, the existence of older technology limited Xerox’s ability to increase its prices).