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RESOLVING NUISANCE DISPUTES: THE SIMPLE ECONOMICS OF INJUNCTIVE AND DAMAGE REMEDIES

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ABSTRACT

In nuisance-type cases, legal commentators generally recommend - and the courts seem to increasingly use - the award of damages rather than the granting of an injunction of the harmed party. This essay compares the economic consequences of injunctive and damage remedies under a variety of circumstances. The discussion focuses on the ability of the remedies to deal with the strategic behavior of the litigants, the cost of redistributing income among the litigants (or classes of litigants), and the imperfect information of the courts. In ideal circumstances - cooperative behavior, costless redistribution, and perfect information - injunctive and damage remedies are equivalent. The presence of strategic behavior alone does not change this conclusion. However, if it is also costly to redistribute income, the remedies are no longer equivalent. When there are a small number of litigants in these circumstances, neither remedy is generally more effective. When there are a large number of litigants, the damage remedy is superior. Finally, and most realistically, if the courts also have imperfect information, neither remedy dominates the other. Thus, the general presumption in favor of damage remedies is not supported.

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I. INTRODUCTION

This essay compares the use of two private remedies--injunctions and damages—to resolve what will be referred to as a "nuisance dispute."[1] By a nuisance dispute I mean any situation in which some injurer (or group of injurers) harms some victim (or group of victims) in a continuing, non-accidental way.[2] Nearly all instances of pollution fit this description, as do many other types of land use conflict. Some specific examples are emissions from a factory falling upon a neighboring property, bright lights or noise disturbing a person's sleep, or an unsightly building constructed in an attractive residential neighborhood.

Because of litigation and other administrative costs, the use of private remedies to resolve nuisance disputes makes most sense when there are very few parties involved, or when a large number of parties can be represented cheaply and effectively by a single individual.[3] Accordingly, the focus of this essay is on the so-called "small number" case described by these conditions. However, the "large number" case also will be discussed.

The problem of resolving nuisance disputes may, following Calabresi and Melamed,[4] be usefully thought of as involving two steps. An initial determination must be made regarding who is entitled to prevail in the dispute. Should the polluter be given the right to pollute, or the pollutees the right to be free from pollution? Then, in the language of Calabresi and Melamed, a decision must be made whether to protect the entitlement by a "property rule" or a "liability rule." The former grants the holder of the entitlement an injunction while the latter awards him damages, determined by some collective authority such as a court. Thus, they explain, there are four possibilities, depending on who is given the entitlement and how it is protected.

Most recent legal commentaries on nuisance law have strongly recommended the use of damage remedies--liability rules--rather than injunctive remedies--property rules.[5] Whether court decisions also favor damage remedies is unclear, although many commentators believe there is a trend in this direction.[6] Essentially three reasons have been suggested for this preference. These will be referred to as the extortion, strategic behavior, and "bonus payment" arguments.[7]

The first argument against injunctive remedies is that they supposedly allow the plaintiff to "extort" the defendant. This possibility arises whenever the potential cost imposed on the defendant by enforcement of the injunction exceeds the plaintiff's damages. For example, a pollutee may suffer $1,000 damages while the lost profits to the polluter if his plant is shut down by the injunction may be $10,000. Because the defendant may be willing to pay up to his potential cost to prevent enforcement, the plaintiff can obtain compensation (possibly far) in excess of his actual damages. Since under a damage remedy damages are set by the court--presumably at $1,000 in this example--there is apparently no scope for extortion. This argument for damage remedies is distributionally oriented since successful extortion is consistent with the efficient resolution of the conflict. In other words, the plaintiff's ability to obtain a large share of the joint benefits from the efficient resolution of the dispute does not imply that the dispute will not be resolved efficiently.

The strategic behavior argument for damage remedies concerns the efficiency consequences of unsuccessful extortion. The efficient result may require not enforcing the injunction, but when extortion is possible, the plaintiff may hold out for more than the defendant is willing to pay. In other words, strategic behavior may lead to enforcement of the injunction when enforcement would not be efficient. In the previous example, the plaintiff may hold out

for $8,000 while the defendant may refuse to pay anything over $5,000. As a result, the plaintiff may enforce the injunction and have the defendant's plant shut down (at least for some period). In contrast, it is argued that the award of damages would overcome strategic behavior problems because the defendant would be induced to decide unilaterally how to behave. In the example, any damage award under $10,000 presumably would lead the defendant to choose to keep his plant in operation.

The third argument for damage remedies is usually treated as subsidiary to the other two. Once it has been decided to use a damage remedy for either of the other reasons, it is possible to pursue additional distributional goals by increasing ("bonus payments") or reducing the monetary payment relative to actual damages. In the example, suppose the plaintiff is poorer than the defendant and a more equal distribution of income is desired. The damage award apparently can be finely tuned to achieve the precise amount of redistribution preferred. This may be beneficial since redistribution by other means--such as the income tax system--may be costlier (in an efficiency sense). In contrast, distributional outcomes under the injunctive remedy are indeterminate because of extortion and strategic behavior possibilities. For example, extortion may lead the defendant to pay the plaintiff any amount between $1,000 and $10,000; or, if the injunction is enforced, extortion may lead to the defendant shutting down, losing $10,000, and to the plaintiff suffering no damages.

The three arguments, taken together, amount to the proposition that damage remedies are better able to achieve the efficient outcome (the strategic behavior argument) and to promote collectively desired distributional results (the extortion and bonus payment arguments).[8/] The pursuit of these goals--efficiency and distributional equity-will be the standard by which injunctive and damage remedies will be evaluated in this essay.[9/]

However, it will be shown that in realistic circumstances the preference for damage remedies is not generally supportable. In terms of efficiency, this is because damage remedies are just as susceptible to strategic behavior problems as injunctive remedies when, realistically, damages are not correctly estimated by the court. And in terms of distributional equity, this is because damage remedies are not nearly as flexible distributionally as is usually presumed. Damage remedies still may be preferable in some circumstances, but injunctive remedies may be superior in other circumstances. By systematically exploring the relative merits of the remedies in different situations, I hope to provide a better understanding of when each should be used.

The essay is organized as follows. In Section II the two goals of efficiency and distributional equity are discussed in more detail. In Section III, the "instruments" for achieving these goals--entitlements and the remedies for their protection--are also discussed in more detail. Then, in Sections IV through VIII, the remedies are analyzed under different assumptions about the bargaining behavior of the litigants, the cost of redistributing income among the litigants (or classes of litigants) by means other than the remedies, and the information available to the court. In each of these sections it is assumed that there is one injurer and one victim. Section IV begins with the best of all possible worlds--the parties bargain cooperatively, income can be redistributed costlessly among the litigants, and the courts have perfect information. Sections V through VIII then add complications, one at a time, in the following order: the strategic behavior of the litigants, the cost of redistributing income among the litigants, and the imperfect information of the courts (of two varieties). In Section IX the remedies are discussed when there is one injurer and many victims. Finally, Section X reexamines the three arguments

for damage remedies discussed in the introduction. (It may be helpful to read Section X before the others.)

The basic conclusions of this essay can be briefly stated as follows. In the best of all possible worlds--cooperative behavior, costless redistribution, and perfect information--injunctive and damage remedies are equally desirable. The presence of strategic behavior alone does not change this conclusion. However, if it is also costly to redistribute income, the remedies are no longer equivalent. When there are a small number of litigants in these circumstances, neither remedy is generally preferable. When there are a large number of litigants, the damage remedy is superior. Finally, and most realistically, if the courts also have imperfect information, neither remedy is generally preferable. Depending on what information is available, the injuctive or the damage remedy may be more desirable. Thus, the general presumption in favor of damage remedies is not supported.

II. THE GOALS: EFFICIENCY AND DISTRIBUTIONAL EQUITY

The arguments against injunctive remedies discussed in the introduction were based on the desirability of attaining two goals--one relating to the efficient allocation of resources, the other relating to the desired distribution of income among individuals. Before examining in detail how injunctive and damage remedies can be used to pursue efficiency and distributional equity, it will be useful to examine these goals more precisely.

The efficient resolution of the dispute might involve the parties coexisting, but adjusting their behavior. For example, in many pollution conflicts the efficient resolution is for the pollutees to remain at their present locations, and for the polluter to reduce--but not eliminate--his pollution. This is, in fact, the "textbook case" in most discussions by economists of externality problems.[10/]

Alternatively, the efficient solution might involve one of the parties shutting down or moving away. For example, the efficient solution might require that the polluter remain and the pollutees relocate, or vice versa.[11/]

For the purposes of this essay, it will be assumed that the efficient solution is of the first type--the parties coexist but one should accommodate.[12/] Specifically, the discussion will be in terms of a polluting factory next to a group of residents, who for now will be assumed to be represented by a single party (sometimes referred to as "the resident").[13/] To further simplify the situation, it will be assumed that each unit of the factory's output causes the same amount of damage (and that the residents cannot affect the level of damages by their behavior). These assumptions are unrealistic in many respects, but the basic points to be developed will apply as well to more complicated situations. It is also assumed that at low levels of the

factory's output each unit of output increases the factory's profits more than it increases the residents' damages and that at high levels of the factory's output, the reverse is true. The efficient solution is to have the factory pollute as long as the factory's extra profit from the last unit of production (the marginal profit) exceeds the residents' increase in damages from that unit of production (the marginal damage); any smaller output would involve losses to the factory greater than the gains to the residents, and any greater output would impose losses on the residents greater than the gains to the factory.[14]

A simple numerical example, which will be used throughout this essay, may serve to illustrate the nuisance dispute. The basic data are provided in Table 1. If the factory produces nothing, it earns nothing and causes no damage.[15] Thus, the joint profits of the parties--total profits less total damages--are also zero. The first unit of output by the factory results in $17,000 profits to itself and causes $7,000 damage to the residents. Thus, joint profits are $10,000 (= $17,000 - $7,000). The change in joint profits from the previous level of output is also $10,000 (= $10,000 - $0). This change will be referred to as the marginal "gains from trade" (the motivation for this terminology will become clear-[16]). The second unit of output leads to an additional $13,000 profits to the factory and an additional $7,000 damages to the residents, resulting in total profits to the factory of $30,000 and total damages to the residents of $14,000. At this level of output, the joint profits of the parties are $16,000 (= $30,000 - $14,000) and the marginal gains from trade are $6,000 (= $16,000 - $10,000). The results for the remaining output are interpreted similarly. Note that eventually--at the sixth unit of output--the factory actually loses money by producing more (for example, because its marginal production costs are rising steeply).

TABLE 1

Output of Factory	Marginal Profits of Factory	Marginal Damages of Residents	Total Profits of Factory	Total Damages of Residents	Total Profits less Total Damages	Marginal "Gains" from Trade"
0	--	--	$0	$0	$0	--
1	$17,000	$ 7,000	$17,000	$ 7,000	$10,000	$10,000
2	13,000	7,000	30,000	14,000	16,000	6,000
3	9,000	7,000	39,000	21,000	18,000	2,000
4	5,000	7,000	44,000	28,000	16,000	-2,000
5	1,000	7,000	45,000	35,000	10,000	-6,000
6	-3,000	7,000	42,000	42,000	0	-10,000
7	-7,000	7,000	35,000	49,000	-14,000	-14,000

In the numerical example the joint profits of the parties are maximized at $18,000 when the factory produces three units of output. This output will be referred to as the "efficient" output.[17] A useful way of viewing the joint profit maximizing or efficient output is in terms of the marginal gains from trade. At every output except the third unit, there are marginal gains from trade, i.e., joint profits can be increased by changing the level of output. If output is less than three units, joint profits can be increased by increasing output, while if output is greater than three units, joint profits can be increased by reducing output. Only at an output of three units will any change result in smaller joint profits. For this reason, it will be said that at the efficient or joint profit maximizing output, all of the gains from trade have been "exploited."

The second potentially important component of any nuisance dispute involves distributional considerations.[18] For example, even if the efficient solution were achieved, it must still be decided who is to bear the remaining damages and who is to reap the gains from trade of getting to the efficient solution. In the numerical example, at the efficient output the residents suffer $21,000 in damages and the total gains from trade are, starting from zero output, $18,000. It is not necessary for purposes of this essay to discuss how these distributional choices should be made. The question answered here is a simpler one: how do injunctive and damage remedies compare in their ability to achieve distributional goals, regardless of the specifics of those goals?

Although two of the three traditional arguments used to evaluate nuisance remedies were based on distributional considerations (the extortion and bonus payment arguments), it might be argued that such considerations should not affect the choice of the remedy since distributional goals can be better handled

by other means, like the income tax system. While it is undoubtedly true that broad distributional goals can be better promoted through the tax system, this does not imply that distributional considerations should be totally ignored in the choice of nuisance remedies. First of all, many versions of both injunctive and damage remedies may be able to reach the efficient outcome (e.g., in the case of the damage remedy, there may be many liability schedules which are efficient[19]). Since redistribution through the tax system (or by other means) is costly,[20] it makes sense to use the distributional goal to break efficiency ties. Secondly, even when the efficiency goal points toward one remedy, it may be desirable to allow distributional considerations to have some weight. Again, this is because redistribution by means other than the remedies is costly. To see the relevance of the distributional goal, consider the following extreme example. Suppose the distributional goal strongly favors redistribution to the poor and that the degree of progessivity of the income tax necessary to achieve this would lead individuals to work and earn very little. In other words, redistribution through the tax system may not be very effective and may cause substantial distortions in work effort. On the other hand, suppose most poor persons live near polluting factories and that these factories are owned primarily by much richer persons. Then the remedy chosen to resolve the nuisance dispute may also be a useful instrument for improving the distribution of income. Even if there is a remedy which is efficient, it may be desirable to choose an inefficient alternative if it can achieve the desired redistribution without too much sacrifice in efficiency.[21]

Obviously, the ability to redistribute through the choice of nuisance remedies depends on how closely the plaintiffs and defendants in typical nuisance disputes correspond to the groups between which redistribution is desired. In practice, I would expect there to be some correspondence between

these categories (for example, nuisance plaintiffs probably are poorer than nuisance defendants), but often not a very large one. For this reason, the reader should keep in mind the possibly limited role for the remedies with respect to redistribution. However, because the distributional goal is central to at least one of the traditional arguments for damage remedies (the bonus payment argument) and because there are undoubtedly many nuisance disputes where it does play an important role in addition to the efficiency goal, it's relevance to the choice of nuisance remedies is seriously considered in this essay.

It will often be convenient to subsume the goals of efficiency and distributional equity within a more general concept of "social welfare". Social welfare can be thought of as a weighted average of the two underlying goals, with the weights assigned according to their relative importance. Social welfare thus provides a single measure for comparing injunctive and damage remedies.

III. THE INSTRUMENTS: ENTITLEMENTS AND REMEDIES FOR THEIR PROTECTION

Entitlements are sometimes thought of as absolute: either the residents are entitled to be free of all pollution, or the factory is entitled to pollute any amount desired (presumably the amount which would maximize its profits).22/

If entitlements are absolute, there is no ambiguity about the distinction between injunctive and damage remedies. If the entitlement is given to the residents, then the only question is whether the factory must buy their permission to pollute--an injunctive remedy--or must pay court-determined damages. Similarly, if the entitlement goes to the factory, then the only question is whether the residents must "bribe" the factory to reduce pollution--an injunctive remedy--or must pay the company "damages" (presumably reduced profits), again determined by a collective authority like a court. This last possibility is unconventional, although it has been used.23/ It will be referred to here as a reverse damage remedy or liability rule.24/

There is no logical reason, however, to view entitlements as absolute. They might also be intermediate. For example, the factory might be entitled to pollute up to some point and the residents would be entitled to be free of pollution beyond this point.25/ Any level of the factory's output could serve as the basis for defining an intermediate entitlement.

Once entitlements are treated as intermediate, there is a certain ambiguity in the use of injunctive and damage remedies. Unlike the situation when entitlements are absolute, there are two directions in which output might be changed. Given an intermediate entitlement, the factory might want to increase its output, or the residents might want to decrease the factory's output. The types of remedies governing these two changes could be the same, but they do not have to be.

When intermediate entitlements are discussed in this essay, the injunctive and damage remedies will be defined in the following manner. Under an injunctive remedy, each party can enjoin deviations from the entitlement point. Under the normal version of the damage remedy, the factory can increase its output beyond the entitlement point if it pays the residents the court-determined damages; if the residents want the factory's output lowered they would be required to "bribe" the factory. Under the "reverse" damage remedy, the residents could reduce the factory's output upon payment to the factory of "damages"; if the factory wants to increase output it would be required to bribe the residents. These definitions of injunctive and damage remedies are the ones generally used by legal commentators.26/

IV. THE BEST OF ALL POSSIBLE WORLDS

Imagine a world, admittedly unrealistic, in which parties to a nuisance dispute bargain cooperatively (in the sense that they exploit all gains from trade), income can be redistributed costlessly, and courts have perfect information.[27/] It will be useful to analyze injunctive and damage remedies in this idealized setting before examining them in more realistic contexts.

In the present setting injunctive remedies are efficient regardless of the entitlement point chosen. Consider, for example, an absolute entitlement given to the resident-victim. Starting from zero output, the factory would gain $17,000 in profits if it could produce one unit. Since the victim would only suffer $7,000 in damages, they could strike a deal in which the factory pays the resident at least $7,000 and no more than $17,000 in order to produce one unit. Assuming cooperative behavior, such a deal would be struck. How much is actually paid by the factory to the resident is indeterminate without further assumptions and might be said to depend on the relative bargaining strengths of the two parties. As long as the factory's marginal profits exceed the resident's marginal damages, similar deals can and will be made. Thus, the parties will bargain to three units, the efficient output.

The same reasoning applies to any other entitlement point, whether an absolute one to the factory, or an intermediate one. If the entitlement is an intermediate one, there are potentially two directions in which the parties can bargain. However, it is always the case that deals can be struck only in one direction--toward the efficient outcome. For example, consider an entitlement point corresponding to four units of output. An increase in output by one unit will increase the factory's profits by $1,000, but will increase the resident's damages by $7,000. There is no way the factory can

buy off the resident. However, a reduction in output by one unit will reduce the factory's profits by $5,000 and the resident's damages by $7,000. Thus, the resident would pay the factory something between $5,000 and $7,000 to reduce output by one unit to the efficient output of three units. Once the parties are at the efficient output, no deals can be made in either direction.

When an injunctive remedy is used, the distribution of income between the parties will, of course, be affected by the choice of the entitlement point. Everything else equal, the closer an intermediate entitlement comes to being an absolute entitlement to one of the parties, the better off that party is and the worse off the other party is. However, the distributional effects of any given entitlement are indeterminate. The source of this indeterminacy is that there are many possible mutually beneficial agreements that will move the parties from the entitlement point towards the efficient solution to the dispute; each agreement involves a different division of the gains from trade between the parties. Each party will obtain some portion of the gains from trade, but this fraction may range from close to zero to close to one, depending on the relative bargaining strengths of the parties. Thus, one of the key features of injunctive remedies is their distributional indeterminateness.

Since it is assumed that redistribution by means other than the remedies is costless, the distributional indeterminacy of the injunctive remedy is not of any consequence. No matter what distributional outcome results from the bargaining process, it can be modified in any way desired by lump-sum transfers. For example, suppose an absolute entitlement to the victim is used and that the parties are equally good bargainers in the sense that they split the gains from trade in half. Thus, the factory would pay the resident $12,000 in order to produce the first unit ($7,000 for damages plus $5,000

for half of the gains from trade), leaving the factory with marginal profits of $5,000 (= $17,000 - $12,000). Similarly, the factory would pay $10,000 and $8,000 for the second and third units, leaving it with marginal profits of $3,000 and $1,000 for those units. The factory's total profits would therefore be $9,000 (= $5,000 + $3,000 + $1,000), and the resident would be compensated $9,000 in excess of actual damages. This result simply reflects the fact that the total gains from trade, starting at zero output, are $18,000, and that these gains are split in half. Suppose, however, that social welfare is maximized when two-thirds of the gains from trade go to the victim. In other words, the ideal distribution of income is for the resident to have $12,000 and for the factory to get $6,000. A $3,000 lump-sum tax on the factory transferred to the resident will achieve this, given the actual bargaining outcome. Obviously, the same result can be achieved no matter what the relative bargaining strengths of the parties are.

In the present setting, damage remedies will also be efficient regardless of the entitlement point chosen. Consider again an absolute entitlement to the resident-victim. Suppose also that the factory is liable to the resident for actual damages suffered--$7,000 per unit of output. Starting from zero output, the factory would gain $17,000 in profits before damage payments if it produced one unit of output. Clearly it will choose to do so. Moreover, there is no incentive for the resident to attempt to pay the factory not to increase output since he is fully compensated. Similarly, the factory will choose to produce the second and third units, and the resident will not find it worthwhile to try to stop this. Since liability exceeds marginal profits beyond the third unit, the factory will remain at that output, the efficient one.

The same reasoning applies to any other entitlement. For example, consider the intermediate entitlement corresponding to four units of output. In this case the damage remedy would take the "reverse" form--the resident would have the right to choose the factory's output upon payment to the factory of its "damages" (reduced profits) from the entitlement point. Thus, the resident would clearly choose to have the factory decrease output from four to three units since the resident's damages are reduced by $7,000, but the factory only has to be compensated $5,000. The resident would have no further incentive to decrease the factory's output since the factory's reduction in profits would exceed the resident's reduction in damages. Again, the efficient output is arrived at.

Thus far, the damage remedy has been analyzed on the assumption that the schedule of liability corresponds to the actual damages suffered. However, assuming cooperative behavior, any schedule of liability would also lead to the efficient solution. Take, for example, an absolute entitlement to the victim with liability of $4,000 per unit of output. Since the factory's marginal profits exceed $4,000 for the first four units of output, the factory will initially produce four units, "overshooting" the efficient output. However, the resident then has an incentive to strike a deal with the factory to reduce output one unit. This is because the resident will be $3,000 better off (the $7,000 savings in damages offset by a $4,000 liability payment not received), while the factory will only be $1,000 worse off (a $5,000 reduction in profits offset by not having to make a $4,000 liability payment). Thus, the resident would pay the factory something between $1,000 and $3,000 to reduce output by one unit to the efficient output of three units. Once at this output, there are no further bargains which can be struck.

When a damage remedy is used, the distribution of income between the parties is clearly affected by the choice of the entitlement point. Everything else equal, each party is best off by having the entitlement point as close to an absolute entitlement to him as possible. The main difference from the injunctive remedy is that the distribution of income can be, depending on the schedule of liability used, completely determinate and independent of the relative bargaining strengths of the parties. This was illustrated, for example, in the case of an absolute entitlement to the victim with liability equal to actual damages. The victim was compensated for his actual damages and the factory obtained all of the gains from trade. There was no scope for bargaining since at no ouput could the resident bribe the factory not to increase output.

However, the distributional outcome under the damage remedy is not always determinate and independent of the parties' bargaining strengths. This was seen in the case of an absolute entitlement to the victim with liability of $4,000 per unit of output. In this case it was shown that the factory would initially "overshoot" the efficient output and the resident would offer between $1,000 and $3,000 to have the factory produce at the efficient output. The actual settlement depends on the relative bargaining strengths of the parties.

Again, since it is assumed that income can be redistributed costlessly by lump-sum transfers, the distributional outcome of the damage remedy--whether determinate or not--is of no consequence. While it may be possible to structure the damage remedy so that it can simultaneously reach the efficient outcome and the distributionally equitable outcome, if this is not possible, the remedy should be designed only to reach the efficient outcome

(e.g., by making liability equal to actual damages). The distributional goal can be handled separately by lump-sum transfers.

Thus, in the best of all possible worlds, either an injunctive remedy or a damage remedy can be used to achieve the social welfare maximum. In each case, the cooperative behavior of the parties guarantees that the remedy will be efficient and the availability of costless redistritution assures that distributional equity will not be sacrificed by the pursuit of efficiency. The fact that the court has perfect information is irrelevant.

V. STRATEGIC BEHAVIOR

Parties to a dispute can hardly be counted on to always act in a cooperative manner. The fact that unions strike and nations go to war suggests that an assumption of cooperative behavior would be unrealistic in a nonlegal setting. And the fact that parties frequently go to court rather than settle more cheaply out of court suggests that this assumption is often unrealistic in a legal setting.[28] For these reasons, it will now be assumed that the parties to the nuisance dispute behave strategically in the sense that they do not exploit all of the gains from trade. This kind of behavior might result from the desire of each party to hold out for a large share of the gains from trade. If both parties are "stubborn"--because each wants to establish himself as a tough bargainer--then they may fail to reach an agreement.[29] It will still be assumed for now that income can be costlessly redistributed between the parties and that the courts have perfect information.

In the present setting injunctive remedies are no longer efficient regardless of the entitlement point chosen. Consider, for example, an absolute entitlement to the resident. Although the factory would gain $17,000 from producing the first unit of output and the resident would suffer only $7,000 in damages, the resident might hold out for an unacceptably large "bribe" from the factory. If this happens, the injunction would be fully enforced and the factory would be driven, inefficiently, out of business. Even if the parties agree on how to split the gains from trade of $10,000 (= $17,000 - $7,000), the bargaining problem arises again over the next unit of output. Assuming strategic behavior, the parties may agree to move somewhat towards the efficient output, but they will not get there. This problem arises whenever the entitlement point differs from the efficient output since there are then potential gains from trade over which the parties must bargain.

This discussion suggests a simple way to overcome the inefficiency of strategic behavior under the injunctive remedy--start with an entitlement point which coincides with the efficient output. This works because there are no remaining gains from trade over which the parties can possibly bargain and therefore no scope for strategic behavior. Thus, the parties will stay at the efficient output.

In general, the distribution of income under the injunctive remedy is indeterminate because it depends on the parties' relative bargaining strengths and on the extent of the bargaining failure due to strategic behavior. However, if the entitlement point is the efficient output, the distribution of income is completely determined since there are no gains from trade over which the parties bargain and therefore no scope for bargaining failure. In the numerical example, the total profits of the factory at the efficient output of three units would be $37,000 and the total damages of the resident would be $21,000. Although there is no reason in general why the particular distribution of income which results from choosing the efficient output as the entitlement point is the most equitable one, this distribution can be modified in any way desired since it is still assumed that costless redistribution is possible. Thus, despite strategic behavior, the injunctive remedy can be used to achieve the efficient and the distributionally equitable outcome.

In the present setting the damage remedy is no longer efficient regardless of the liability schedule. In particular, if liability ever exceeds actual damages, a situation is created in which the parties have an incentive to bargain over (at least some of) the gains from trade. For example, suppose there is an absolute entitlement to the resident and that the liability schedule is constant at $9,000. In considering whether to produce one unit of output the factory will realize that while it will gain $8,000 (= $17,000

- $9,000), the resident will also gain $2,000 (= $9,000 - $7,000, i.e., liability payments less actual damages). By not producing the first unit of output, the factory can deny this gain to the resident. If the factory believes that it is a better bargainer than the resident, it may threaten to deny this gain unless the resident pays some specified amount up to his full gain of $2,000. If the resident believes that he is the better bargainer, he may not give in to this demand. As a result, the factory may end up carrying out its threat in order to make future threats credible. Even if the parties get past this first hurdle, the same problem arises with respect to the second unit of output. Assuming strategic behavior, the parties' bargaining will break down at some output short of the efficient output.

The kind of "extortion" just described cannot occur under the damage remedy if liability is equal to actual damages. To see this, suppose that the factory is liable for the $7,000 actual damages imposed on the resident starting at the entitlement of zero output. Since the resident is not over-compensated, there is no incentive for the factory to threaten to not produce the first unit of output. Moreover, it is not possible for the resident to bribe the factory not to produce the first unit of output. The factory would have to be paid its after-liability marginal profits of $10,000 (= $17,000 - $7,000), but the resident would not be willing to offer anything since, with full compensation, he is indifferent whether the first unit is produced or not. The resident is also indifferent with respect to every other level of output. Thus, the factory will maximize its after-liability profits by producing at the efficient output of three units.

It is also the case that extortion cannot occur if liability is less than actual damages up to the efficient output (and greater than actual

damages beyond the efficient output).[30/] Suppose, for example, that the factory's liability is $5,000 for the first unit of output, $6,000 for the second unit, and $7,000 for each subsequent unit. If the first unit is produced, the factory gains $12,000 (= $17,000 - $5,000) and the resident loses $2,000 (= $7,000 - $5,000). Since the resident would only be willing to pay up to $2,000 to prevent the factory from producing the first unit, there is no way the resident could bribe the factory to not produce the first unit. The same analysis applies to the second and all subsequent units. Thus, the factory will again maximize its after-liability profits by producing at the efficient output.

When a damage remedy is used, the distribution of income is completely determinate and independent of the relative bargaining strengths of the parties if liability is less than or equal to actual damages up to the efficient output (and greater than or equal to actual damages beyond the efficient output). This was illustrated in the two preceding examples in which, respectively, liability was equal to and less than actual damages. In both cases the victim suffered his actual damages less liability payments and the factory obtained its full profits less liability payments. There was no scope for bargaining in either case. Note that in both cases the factory obtained all of the gains from trade. By choosing the entitlement point and the particular schedule of liability--less than or equal to actual damages--between the entitlement point and the efficient output, it is possible to achieve a wide range of distributional outcomes under the damage remedy. However, for reasons discussed in the next section, not all possible income distributions can be achieved in this way. But since it is still assumed that costless redistribution is possible, this limitation of the damage remedy does not matter at this point. If the desired distribution of income cannot be achieved

directly by the damage remedy, lump-sum transfers can be used to achieve it. Thus, despite strategic behavior, if the liability schedule is chosen appropriately, the damage remedy can be used to reach the efficient and the distributionally equitable result.

Thus, despite the presence of strategic behavior, either an injunctive remedy or a damage remedy can be used to reach the social welfare maximum, provided redistribution is costless and the court has perfect information. Strategic behavior can be overcome under the injunctive remedy by the appropriate choice of the entitlement point--coinciding with the efficient output. And strategic behavior can be overcome under the damage remedy by the appropriate choice of the liability schedule--for example, coinciding with the victim's actual damage schedule. Given perfect information, these choices are feasible, and in each case they lead to the efficient outcome. The availibility of costless redistribution again assures that distributional equity will not be sacrificed by the pursuit of efficiency.

VI. COSTLY REDISTRIBUTION

The assumption thus far that income could be costlessly redistributed by lump-sum transfers has been a convenient fiction. In general, income redistribution is costly in the sense that the methods of redistribution inevitably create "distortions" in individuals' behavior.[31/] For example, the major distorting effect of an income tax is to lower the effective price of leisure (which is the after-tax wage rate) relative to purchasable commodities, thereby causing persons to work less hard, everything else equal. To emphasize the implications of costly redistribution, it will now be assumed that redistribution by means other than through the design of injunctive and damage remedies is impossible. The assumption of strategic behavior will be maintained from the previous section and it will still be assumed for now that the courts have perfect information.[32/]

In the present setting injunctive remedies are no longer able in general to simultaneously achieve the efficient and the distributionally equitable solution. In order to reach the efficient result, it was seen in the previous section that it is necessary because of strategic behavior to choose the efficient output as the entitlement point. It was also seen that this choice implied a particular distribution of income. Only by coincidence would this distribution be the equitable one. Now, since lump-sum transfers are not available, the only way to change the distribution of income is by changing the entitlement point. But if the entitlement point does not coincide with the efficient solution, then efficiency will not be achieved because of strategic behavior. Thus, in the present setting, there is a fundamental conflict between efficiency and distributional equity under the injunctive remedy.

It will be useful to consider how well the injunctive remedy can do when social welfare depends primarily on distributional equity rather than efficiency, and when the distributional goal strongly favors the resident-victim relative to the factory-injurer. Under the injunctive remedy, the best off the resident can be made is to have an absolute entitlement assigned to him. He is thereby guaranteed not to have to suffer any damages. Moreover, the resident will obtain some share of the gains from trade if the parties can agree on how to share these gains. Since the parties are assumed to bargain strategically, suppose they are able to reach an agreement only with respect to the first two units of output, stopping short of the efficient output of three units. The gains from trade in moving from zero output to two units is $16,000. Thus, the resident will end up with some amount between $1 and $15,999 (assuming dollars are not divisible), depending on the relative bargaining strengths of the parties.

It was seen in the previous section that in order for the damage remedy to avoid the problems created by strategic behavior, it is necessary that liability be less than or equal to actual damages up to the efficient output (and greater than or equal to actual damages beyond the efficient output). It will now be shown in the following example that there is no advantage in terms of efficiency or distributional equity to setting liability less than actual damages.

Suppose there is an absolute entitlement to the resident and that the factory's liability is $2,500 for the first unit of output, $4,500 for the second unit, and $7,000 for each subsequent unit. Thus, liability is less than actual damages for the first two units. Since the resident cannot bribe the factory to reduce output, the factory will produce at the output which maximizes its after-liability profits--an output of three units. The resident

suffers a marginal loss (after receiving the liability payment) of $4,500 from the first unit (= $7,000 - $2,500), $2,500 from the second unit, and nothing from all subsequent units. Thus, at the efficient output the resident suffers total losses of $7,000 (= $4,500 + $2,500). Similarly, the factory's marginal profits (after making the liability payments) are $14,500 from the first unit (= $17,000 - $2,500), $8,500 from the second unit, and $2,000 from the third unit. Thus, the factory's total after-liability profits are $25,000. Now suppose that the entitlement is changed from an absolute entitlement to the resident to an entitlement corresponding to one unit of output and, at the same time, liability (beyond the entitlement point) is set equal to actual damages. Again, the factory will end up producing at the efficient output of three units. Since the resident's marginal damages are now $7,000 for the first unit and zero for all subsequent units, the resident's total damages are $7,000, the same as before. And since the factory's marginal profits are now $17,000 for the first unit (since there is no liability), $6,000 for the second unit (= $13,000 - $7,000), and $2,000 for the third unit, the factory's total profits are $25,000, the same as before. Thus, both with respect to efficiency and distributional equity, the outcome is unaffected.

This example illustrates something which is true in general: any distributional outcome achievable by choosing some entitlement point with liability less than actual damages can be duplicated by starting from a different entitlement point with liability equal to actual damages.[33/] Put another way, there is no advantage with respect to distributional equity to setting liability less than actual damages.

The discussion thus far suggests that the schedule of liability under the damage remedy should coincide with the schedule of actual damages. Liability schedules which overcompensate are subject to strategic behavior problems.

Liability schedules which undercompensate provide no advantages. Assuming that liability equals actual damages, the damage remedy will be efficient regardless of the entitlement point since the factory will maximize its after-liability profits at the efficient output. Although there may be an argument, discussed below, for setting liability in excess of actual damages despite the strategic behavior problems, it will be assumed for now that liability is set equal to actual damages.

Since setting liability equal to actual damages leads to the efficient output regardless of the entitlement point, the choice of the entitlement point can be based solely on distributional considerations. Each entitlement corresponds to a particular distribution of income. For example, setting the entitlement at two units of output implies that the factory's profits will be $32,000 (= $17,000 + $13,000 + $2,000) and the resident's losses will be $14,000 (a loss of $7,000 from each of the first two units of output). If this is the desired distributional outcome, then it can be reached under the damage remedy (without sacrificing efficiency).

Suppose, however, that the distributional goal strongly favors the resident relative to the factory. The best off the resident can be made is to be given an absolute entitlement. Assuming liability equals actual damages, this implies that the resident will suffer no damages and the factory will make total profits of $18,000 (= $10,000 + $6,000 + $2,000). Note that <u>all</u> of the gains from trade resulting from the move from zero output to the efficient output of three units--which amounts to $18,000--go to the factory.

The preceding discussion indicates a possible advantage of the injunctive remedy over the damage remedy in the present setting. Although the damage remedy with liability equal to actual damages can achieve the efficient outcome, it will in general be distributionally inferior to the injunctive remedy

when the distributional goal strongly favors the resident-victim relative to the factory-injurer. Under the damage remedy with an absolute entitlement to the resident, the resident suffers no damages but all of the gains from trade go to the factory. Under the injunctive remedy with the same entitlement, it was seen above that the resident is guaranteed not to have to suffer any damages, but also in general obtains some fraction of the gains from trade even though the parties do not reach the efficient output because of strategic behavior. Thus, the resident is always at least as well off, and in general is better off, under the injunctive remedy. If social welfare depends primarily on distributional equity rather than efficiency and if the distributional goal strongly favors the resident-victim relative to the factory-injurer, then the injunctive remedy would be socially preferable to the damage remedy. However, if efficiency is sufficiently important or if the distributional goal does not strongly favor one party, then the damage remedy would be socially preferable.

One final possibility needs to be considered. Thus far, it has been assumed that under the damage remedy liability was set equal to actual damages to avoid the problems of strategic behavior. It was shown that the injunctive remedy might be preferable to this version of the damage remedy on distributional grounds. When distributional equity is the basis for prefering the injunctive remedy, it makes sense to consider the damage remedy with liability greater than actual damages. Although this version of the damage remedy is, like the injunctive remedy, generally inefficient, the question is whether the distributional effects of the damage remedy might now be preferable to those of the injunctive remedy.

It was seen in the previous section that if the resident is overcompensated under the damage remedy, the difference between the liability payment and the resident's actual damages is subject to negotiation because the factory can

deny this gain to the resident by not producing that unit of output. At best, the resident is able to retain all of the excess compensation, and at worst, the resident foregoes all of the excess compensation, leaving the resident just fully compensated for actual damages. Under the injunctive remedy, at best, the resident can obtain all of the gains from trade, and at worst, the resident is fully compensated for actual damages. If the resident is the superior bargainer and comes close to his best outcome, then the resident would be better off under the injunctive remedy unless the liability schedule under the damage remedy coincides with the factory's marginal profit schedule. If liability equals the factory's profits--a type of restitution remedy--then all of the gains from trade are subject to negotiation under the damage remedy, so the resident could still obtain all of the gains from trade if he is the much superior bargainer.[34/]

It may appear, therefore, that the injunctive remedy and the damage remedy with liability equal to the factory's profits are equivalent since they both lead the parties to bargain over all of the gains from trade. However, there is one potentially important remaining difference. Under the injunctive remedy, the resident-victim plays the role of the "hold out" and threatens the other party. Under the damage remedy with overcompensation, the factory-injurer adopts this role. Thus, depending on which party is thought to be more stubborn, it may be preferable to use one remedy or the other.

Thus, when the parties bargain strategically and redistribution is costly, neither remedy is always preferable. However, if the distributional goal does not favor one party too strongly, then the damage remedy is superior to the injunctive remedy and can maximize social welfare. In this case, liability can be set equal to the victim's actual damages, thereby reaching the efficient output, and the entitlement point can be chosen to achieve the distributional

goal. If the distributional goal is strongly weighted toward one party, then the injunctive remedy may be preferable. For example, if the victim's welfare matters most, an absolute entitlement to the victim protected by an injunctive remedy allows the victim to share in the gains from trade, unlike a damage remedy with liability equal to actual damages. Although setting liability in excess of actual damages also allows (at least some of) the gains from trade to be bargained over, the injunctive remedy may still be preferable if the injurer is thought to be the more stubborn "hold out."

VII. IMPERFECT INFORMATION, I: ASSYMETRICAL INFORMATION

The assumption thus far that courts have perfect information may be a useful approximation in some circumstances but is probably not very realistic in general. It will now be assumed that the courts have imperfect information of the following sort. They know the resident-victim's schedule of damages but do not know anything about the factory-injurer's schedule of profits. For example, it is quite plausible that a court may have relatively good information about the damages from pollution but not know much about the cost to the polluter of abating pollution.[35/] (Alternatively, it might be assumed that the court knows the factory's profit schedule but not the resident's damage schedule.[36/] This case is not discussed since it is analogous to the present one.) The assumptions of strategic behavior and costly redistribution will be maintained from the earlier sections.

In the present setting the injunctive remedy cannot achieve the efficient outcome. The reason is simple. To reach the efficient outcome under the injunctive remedy, it is necessary, because of strategic behavior, to choose the entitlement point to coincide with the efficient output. But to determine the efficient output the court must know when the marginal profits of the factory from further production just fall below the marginal damages to the resident. Knowledge of the damage schedule alone is obviously not sufficient to determine this level of output. Although the court could "guess" what the efficient output is, if the court makes a mistake, which it will in general, the parties will not end up bargaining back to the efficient output because of strategic behavior.

It will be useful to consider again how well the injunctive remedy can do when social welfare depends primarily on distributional equity rather than

efficiency, and when the distributional goal strongly favors the resident-victim relative to the factory-injurer. As it turns out, the discussion of this issue in the previous section applies here as well. It is still best to assign an absolute entitlement to the resident. And the resident will in general still obtain some of the gains from trade--how much depends on the relative bargaining strengths of the parties and on the extent to which they stop short of the efficient output because of strategic behavior.

In the present setting the damage remedy can reach the efficient outcome despite the court's imperfect information. This can be guaranteed, however, only by assigning an absolute entitlement to the resident-victim and setting liability equal to actual damages--a type of strict liability solution. Any other entitlement point might lead to the efficient outcome but cannot be guaranteed to. For example, suppose an entitlement point corresponding to four units of output is chosen. Since liability for producing the fifth unit is $7,000 (the resident's damages) and the marginal profits of the factory are only $1,000, the factory will choose to remain at an output of four units. At this output, the resident will have an incentive to "bribe" the factory to reduce output to three units, but because of strategic behavior, the parties in general will not reach that output. On the other hand, if the court chooses an entitlement point corresponding to one, two, or three units of output and sets liability equal to actual damages, the damage remedy will lead the factory to produce at the efficient output. Assuming liability is set equal to actual damages, this shows that the damage remedy leads to the efficient outcome only if the entitlement point is "below" the efficient output. However, since the court cannot determine the efficient output from its limited information, the only way to guarantee the efficient result is to choose the lowest possible entitlement point--an absolute entitlement to the resident.

Obviously, if the liability schedule does not coincide with the damage schedule, there is no reason to believe that the efficient output will be reached regardless of which entitlement point is chosen. For the reasons discussed in the preceding two sections, to avoid strategic behavior problems, liability must be less than or equal to actual damages up to the efficient output (and greater than or equal to actual damages thereafter). Since the court does not have enough information to determine the efficient output, the only liability schedule which will definitely satisfy this requirement is one coinciding with the actual damage schedule.

Assuming that liability equals actual damages, the distributional goal can be promoted by choosing an appropriate entitlement point. However, as seen above, if the entitlement point chosen is "beyond" the efficient output--which the court cannot know--then the outcome will be inefficient because of strategic behavior. Thus, there is a tradeoff between efficiency and distributional equity.

Suppose the distributional goal strongly favors the resident relative to the factory. The corresponding discussion of injunctive and damage remedies in the previous section applies to the present setting essentially without change. Under the damage remedy, if the resident is given an absolute entitlement with liability equal to actual damages, the resident will not suffer any damages but <u>all</u> of the gains from trade will go to the factory. Under the injunctive remedy, at least <u>some</u> of the gains from trade, and possibly most of the gains, go to the resident. Thus, if social welfare depends primarily on distributional equity and if the resident is strongly favored relative to the factory, then the injunctive remedy would be socially preferable to the damage remedy. However, if it is believed that the factory-injurer rather than the

resident-victim is the less stubborn bargainer, then it may make sense to use the damage remedy with liability in excess of actual damages in order to reverse the role of who has the right to "hold out."

Thus, the comparison between injunctive and damage remedies is quite similar to the discussion in the previous section. On balance, however, if the court has assymetrical information, the damage remedy becomes less attractive relative to the injunctive remedy. When the court had perfect information, the damage remedy could both reach the efficient output and achieve the distributionally equitable result if the distributional goal does not strongly favor one party. Now, however, there is frequently a tradeoff between efficiency and distributional equity under the damage remedy even when one party is not strongly favored. Any entitlement choice other than an absolute one to the resident may lead to an inefficient outcome.

VIII. IMPERFECT INFORMATION, II: UNDERSTATED DAMAGES

The assumption in the previous section that the court knows the victim's damages (but not the injurer's profits) may be unrealistic in many contexts. It will now be assumed that the court systematically underestimates the victim's damages. This would seem to be a plausible assumption because in practice the victim's compensation for damages is limited to "objective" damages, excluding any "subjective" (or "idiosyncratic") element. Since the damages actually suffered by the victim include the subjective component, the damage award will not fully compensate the victim.[37/] Thus, it will now be assumed in the numerical example that the court sets liability at $4,000 per unit of output even though the victim's actual damages are $7,000. The assumptions of strategic behavior and costly redistribution will be maintained from the earlier sections.

The discussion of the injunctive remedy in the previous section applies to the present setting as well. The court cannot achieve the efficient outcome because it does not have enough information to determine the efficient output. And when social welfare depends primarily on the victim's welfare, an absolute entitlement to the victim guarantees not only that the victim will not suffer any damages but also that he will obtain some share of the gains from trade.

In the present setting, the damage remedy can no longer in general reach the efficient outcome. Consider, for example, what happens when the court uses an absolute entitlement to the resident-victim. It was seen in the previous section that, given this entitlement point, the damage remedy leads to the efficient output when liability is set equal to actual damages. Now, however, if liability is set equal to the court's estimate of damages, the damage remedy will lead the factory-injurer initially to "overshoot" the efficient output

since liability is too low. In the numerical example, the factory would produce four units of output since marginal profits exceed the marginal liability payments of $4,000 up to and including the fourth unit. Thus, the factory will produce one unit too many. This is not in general the final outcome for the reasons now discussed.

Since the initial production decision of the factory is an inefficient one, there are potential gains from trade. Starting at an output of four units, the resident would gain $3,000 if output were reduced by one unit; his actual damages would fall by $7,000 but he would lose a liability payment of $4,000. The factory would lose only $1,000 by this change; its profits would fall by $5,000 but it would not have to make a liability payment of $4,000 to the resident. Thus, there is an incentive for the resident to pay the factory some amount between $1,000 and $3,000 for the factory to reduce output by one unit. Assuming strategic behavior, such a deal will in general not occur.

There is another reason why the parties may not remain at the output of four units initially chosen by the factory. Suppose the factory increased its output to five units. The resident would suffer additional damages of $7,000 and would receive only $4,000 in liability payments, so he would be worse off by $3,000. The factory would make additional profits of $1,000 but would have to make a $4,000 liability payment, so it would also be worse off by $3,000. Thus, the factory is in a position to <u>threaten</u> to increase output to five units unless the resident pays some amount up to $3,000. If the factory believes it is the better bargainer, such a threat might be made. But if the resident believes he is the better bargainer, he might refuse to pay what the factory demands. As a result, the factory may carry out the threat in order to establish credibility in the next round of negotiations. If the threat is carried out, so the factory increases output to five units, the same kind of situation

arises at five units. At worst, this process could lead the factory to produce seven units.

It will now be useful to compare the injunctive and damage remedies when an absolute entitlement is assigned to the victim for distributional reasons and, in both cases, strategic behavior leads to the worst possible outcome.

Under the injunctive remedy, the worst outcome is for the parties to remain at the entitlement point. At this outcome, the factory earns no profits and the resident suffers no damages, whereas at the efficient output of three units, total profits exceed total damages by $18,000. Thus, there is $18,000 which the parties could split between themselves if they could agree on how to share it. This amount will be referred to as the "efficiency loss."

Under the damage remedy, the worst outcome is for the parties to end up at an output of seven units as a result of the factory having carried out its threats.[38/] At this output, the factory's total profits are $35,000 and its total liability payments are $28,000 ($4,000 per unit of output), so its after-liability profits are $7,000. The resident's total damages are $49,000 but he receives $28,000 in liability payments, so his damages after compensation are $21,000. Thus, between the parties, there is a net loss of $14,000 (= $21,000 - $7,000).[39/] At the efficient output of three units there is a net gain of $18,000. Thus, relative to the efficient outcome the parties are worse off by $32,000 (= $14,000 + $18,000). This is the efficiency loss under the damage remedy.

In terms of efficiency, the preceding discussion shows that when the parties bargain strategically and the court underestimates the resident-victim's damages, the injunctive remedy may be preferable to the damage remedy. In the example, the efficiency loss under the damage remedy was $32,000, whereas it was only $18,000 under the injunctive remedy. In general, either remedy could

be the more efficient one, depending on the degree of strategic behavior and on the extent to which the court underestimates damages.

The injunctive remedy may also be preferable to the damage remedy in terms of distributional equity. Suppose the distributional goal strongly favors the resident-victim enough so that he is given an absolute entitlement (regardless of which remedy is used). The preceding discussion showed that when the worst outcome occurs because of strategic behavior, the resident suffered no damages under the injunctive remedy and uncompensated damages of $21,000 under the damage remedy. Similarly, the factory obtained no profits under the injunctive remedy and after-liability profits of $7,000 under the damage remedy. Thus, the resident-victim is much better off and the factory-injurer is only somewhat worse off under the injunctive remedy. Since it is assumed that the distributional goal strongly favors the resident, it is likely that the injunctive remedy would be preferred. In general, either remedy could be the more equitable one, depending on the specific outcomes under the two remedies and on the relative distributional preferences regarding the two parties.

Thus, when the parties bargain strategically, when income redistribution is costly, and when courts underestimate the victim's damages, neither remedy is generally preferable. This is true regardless of whether the distributional goal strongly favors one party (recall that when the court was assumed to have perfect information, the damage remedy was preferred if the distributional goal did not favor one party too strongly). Once the courts base liability on an underestimate of the victim's damages, the damage remedy is subject to the same kind of strategic behavior problem as the injunctive remedy. This accounts for why, depending on the extent to which the parties bargain strategically and the extent to which the court understates damages, either remedy could be more desirable in terms of efficiency and distributional equity.

IX. MANY VICTIMS

In a nuisance dispute in which there is more than one victim, it is often not practical to have the class of victims represented by a single party. (The same statement applies to injurers, but for simplicity it will continue to be assumed that there is only one injurer.) For concreteness, now suppose there are 1,000 resident-victims, each suffering $7 in damages for each unit of the factory's output. Thus, the data in Table 1 still apply, but in the case of the residents, refer to their aggregate damages. In these circumstances, social welfare will be assumed to depend on the victims' aggregate damages. Much, but not all, of the previous comparison of injunctive and damage remedies carries over to the present setting.

In the best of all possible worlds--cooperative behavior, costless redistribution, and perfect information--injunctive and damage remedies are equally desirable for the reasons discussed earlier. (However, the assumption of cooperative behavior is especially unrealistic when there are many victims because of the cost of their getting together to negotiate with the factory.) The efficient outcome can be reached by setting the entitlement point equal to the efficient output under the injunctive remedy and by setting liability equal to actual damages under the damage remedy. The equitable distribution of income can be achieved in both cases by lump-sum transfers.

Also as before, the presence of strategic behavior does not change matters by itself, although strategic behavior now operates in a different way because of the large number of victims involved. Under the injunctive remedy, if the entitlement point corresponds to an output less than the efficient output of three units, each of the 1,000 victims has the power to block the factory's desired increase in output. In order to obtain as much of the gains from trade as possible, each resident would attempt to be the "hold out"--the final

resident whose consent has to be obtained. The likely outcome is that the aggregate demands of the residents will exceed the maximum willingness to pay of the factory, so the parties will remain at the initial entitlement. If the entitlement point exceeds the efficient output, then the factory must be paid to reduce output. But then each resident will attempt to take a "free ride" on the others' contribution. As a result, the parties will remain at the entitlement point. Efficiency can still be achieved, however, by choosing an entitlement point which coincides with the efficient outcome. And distributional equity can be achieved by lump-sum transfers. Under the damage remedy, the efficient result can be reached if the entitlement point corresponds to an output below the efficient output and liability is equal to actual damages. Each resident is then compensated for his actual damages and there is no scope for strategic behavior. The distributionally equitable outcome can be achieved through lump-sum transfers.

Unlike in the case of one injurer and one victim, if costly redistribution is also a problem, the damage remedy is superior to the injunctive remedy. (Recall that in the case of one injurer and one victim the injunctive remedy could be superior if social welfare depended to a sufficient extent on one party's welfare.) Under the injunctive remedy, the parties remain at the entitlement point either because of "hold out" or "free rider" behavior. Thus, choosing the entitlement point generally involves a tradeoff between efficiency and distributional equity. Whatever entitlement point is chosen, a better result can be achieved under the damage remedy. For example, suppose social welfare depends primarily on distributional equity and the distributional goal strongly favors the resident-victims. Under the injunctive remedy, an absolute entitlement to the residents guarantees that they will not suffer any uncompensated damages, but the hold out problem prevents them or the factory

from obtaining any of the gains from trade. Under the damage remedy with the same entitlement point and liability equal to actual damages, the residents are no better or no worse off, but the factory is induced to produce at the efficient output and is better off by the gains from trade. Thus, social welfare is improved.[40/] It may even be possible now to share the gains from trade under the damage remedy by overcompensating the resident-victims without running into the "extortion" problem discussed earlier (see Section V).[41/] In any event, the damage remedy is preferable to the injunctive remedy in these circumstances.

The same argument in favor of the damage remedy applies when the court also has imperfect information of the asymmetrical sort--complete knowledge of the resident-victims' damage schedules but no knowledge of the factory-injurer's profit (or, equivalently, cost of abatement) schedule. Under the injunctive remedy, the parties remain at the entitlement point, whereas under the damage remedy the factory may be induced to produce at the efficient output at no sacrifice of the welfare of the residents.

Finally, if the court has imperfect information which leads it to understate the victims' damages, then, as in the case of one injurer and one victim, there is no clear preference for injunctive or damage remedies. The reason for this conclusion is similar to the earlier discussion and can be illustrated by a simple example. Suppose, on distributional grounds, an entitlement is chosen corresponding to two units of output. Under the injunctive remedy, this will be the final outcome because of "hold out" behavior. The efficiency loss is $2,000 (the gains from trade from two units to the efficient output of three units). Under the damage remedy, the outcome depends on the court-imposed schedule of liability. Suppose the court's estimate of damages is $4 per unit of output for each of the 1,000 residents. Given liability of $4,000 per

unit of output starting with the third unit, the factory will maximize its profits by producing at four units (see Table 1), overshooting the efficient output by one unit. Because of free rider behavior, the residents will not bribe the factory to reduce output. Similarly, any extortion threat by the factory to increase output will be met by inaction; each resident will let the others pay. Thus, unlike the case of one injurer and one victim, the initial profit maximizing output of the factory will be the final output. At this output (four units), there is an efficiency loss of $2,000, the same as for the injunctive remedy in this example. But the distributional outcome may be worse under the damage remedy since the resident-victims are worse off than they would be if they were at the entitlement point (because they are under-compensated for the third and fourth units of production). Moreover, if the residents' damages were understated by an even greater degree, the efficiency loss under the damage remedy would exceed that of the injunctive remedy.

Thus, if there are many victims, the same basic conclusion applies under the most realistic set of assumptions: neither remedy is generally preferable when the parties bargain strategically, when income redistribution is costly, and when the courts underestimate the victims' damages.

It should be pointed out, however, that the analysis of injunctive and damage remedies when there are many victims may be of limited relevance for two reasons. First, there are numerous ways in which the interests of the parties can be aggregated. A class action is the most common way. Once this occurs, the analysis of the case of one injurer and one victim is more relevant.[42/] Second, if the victims' interests cannot be aggregated, publicly enforced remedies are probably preferable to either of the privately enforced remedies discussed here.[43/] Regulations or fines are two common examples. For these reasons, the emphasis in this essay has been on the case of one injurer and one victim.

X. CONCLUSION

It will now be useful to reconsider the three traditional arguments for damage remedies over injunctive remedies discussed in the introduction. This will be done only within the case of one injurer and one victim. The assumptions which seem most realistic--strategic behavior, costly redistribution and understated damages--will be emphasized.

The first argument against injunctive remedies was that they allowed the plaintiff to "extort" the defendant, that is, to obtain compensation (possibly far) in excess of the plaintiff's actual damages.[44/] It is now clear that "excess" compensation simply means that the plaintiff is sharing the gains from trade with the defendant. Within the present framework, neither party is "entitled" to these gains in the first place. Thus, as has been seen, the desirability of these extortion benefits depends on the distributional goal which is being promoted. If the distributional goal strongly favors the plaintiff and redistribution by other means is costly, then the excess compensation may be desirable.

To the extent that this argument against injunctive remedies is valid because the extortion subverts the distributional goal, the argument may also apply equally forcefully to damage remedies. If the court has imperfect information and understates the plaintiff-victim's damages, then the defendant-injurer is put in a position to "extort" the plaintiff in two ways. Since the defendant's output will initially exceed the efficient output when damages are understated, the plaintiff will have an incentive to bribe the defendant to reduce output. But the defendant can hold out for more than his lost profits, thereby extorting the plaintiff (in the same sense as under the injunctive remedy). Moreover, the defendant can threaten to increase output beyond his profit maximizing output, extorting the plaintiff in this way. Thus, the extortion argument

against the injunctive remedy may be misguided even on its own terms if, realistically, the court underestimates the plaintiff's damages.

The second argument for damage remedies concerned the efficiency consequences of unsuccessful extortion. According to this argument, strategic behavior under the injunctive remedy might lead to the enforcement of the injunction when it was not efficient to enforce it. Given strategic behavior, this criticism is valid whenever the entitlement point does not coincide with the efficient outcome. However, the same type of criticism applies at least as forcefully to the damage remedy when, realistically, courts are assumed to underestimate the plaintiff's damages. As noted in the previous paragraph, when damages are understated, the defendant is put in a position to extort the plaintiff in two ways. Strategic behavior might lead to the defendant's rejection of the "bribe" from the plaintiff to reduce output. Or strategic behavior may lead the defendant to carry out threats to increase output. Either way, the efficiency loss from strategic behavior under the damage remedy could be larger than the efficiency loss under the injunctive remedy.

The third argument favoring damage remedies was based on the apparent distributional flexibility and fine tuning inherent in the liability schedule--the schedule can allow for any amount of overcompensation ("bonus payments") or undercompensation. In contrast, it was noted, the distributional outcome under the injunctive remedy is indeterminate because of strategic behavior. However, the potential distributional superiority of damage remedies requires that the courts have perfect information about the plaintiff's damage schedule. Even then, it has been shown that there is never an advantage to using a liability schedule which undercompensates the victim. Moreover, it has been shown that liability schedules which overcompensate the victim are subject to the same kinds of strategic behavior problems which arise under the injunctive remedy,

thereby destroying the fine tuning advantage. And when, more realistically, courts understate damages, the distributional advantages of the damage remedy may disappear altogether.

The preceding discussion should not be interpreted as stating a case for the use of injunctive remedies. Rather, the goal here has been to examine systematically whether the conventional arguments favoring damage remedies are logically coherent. They are not. Under no set of consistent assumptions is there an unambiguous case for damage remedies (except, possibly, when there are many victims). And under the most realistic set of assumptions--strategic behavior, costly redistribution, and understated damages--the argument could easily go either way.[45/]

Despite the indeterminacy of the optimal remedy in theory, what the best remedy is in practice may turn out to be clear. For example, if it seems that the parties would act very strategically and that the court has relatively good information about damages, then a strong case for a damage remedy can be made. On the other hand, if the parties are likely to bargain cooperatively and the court has bad information about damages, an injunctive remedy may be preferred. The arguments developed in this essay may be helpful in clarifying the goals in resolving nuisance disputes and, given the goals, the principles relevant to choosing the best remedy.

NOTES

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1/ Many of the ideas in this article were developed primarily for an economics audience in more technical form in Polinsky, Controlling Externalities and Protecting Entitlements: Property Right, Liability Rule, and Tax-Subsidy Approaches, 8 J. Legal Studies 1 (1979) [hereinafter cited as Controlling Externalities] and Polinsky, On the Choice Between Property Rules and Liability Rules, 18 Econ. Inquiry --- (1980) [hereinafter cited as On the Choice]. The present article, besides being non-technical and oriented primarily towards a legal audience, organizes the material quite differently.

2/ It is also assumed that the injurer and the victim are not in any kind of contractual relationship.

The traditional common law doctrines of intentional private nuisance and intentional trespass probably come closest to representing what I mean by a nuisance dispute (although I do not necessarily mean to limit nuisance disputes to cases which fall within these doctrines). See, e.g., Restatement (Second) of Torts §§ 157-164 (intentional trespass), 821D, 825 (intentional private nuisance) (1965).

3/ See notes 42-43 infra and accompanying text.

4/ Calabresi & Melamed, Property Rules, Liability Rules, and Inalienability: One View of the Cathedral, 85 Harv. L. Rev. 1089 (1972).

5/ The following comments are indicative:

> Nuisance law would function better if, in general, a plaintiff in a nuisance case were limited to choosing between the remedies of rule two (damages) and rule four...[reverse damages].

Ellickson, Alternatives to Zoning: Covenants, Nuisance Rules, and Fines as Land Use Controls, 40 U. Chi. L. Rev. 681, 738 (1973).

> Heavier reliance by courts upon...[damage remedies] would... benefit not only...the immediate parties to nuisance actions, but also society at large.

Rabin, Nuisance Law: Rethinking Fundamental Assumptions, 63 Virginia L. Rev. 1299, 1300 (1977).

> The Comment concludes that the ideals of flexibility and efficient cost allocation embodied in Boomer [a classic damage remedy case] should be followed in all nuisance cases.

Comment, Internalizing Externalities: Nuisance Law and Economic Efficiency, 53 New York Univ. L. Rev. 219, 220 (1978).

Calabresi & Melamed, supra note 4, present arguments for both injunctive and damage remedies. Their discussion, id. at 1118-19, 1127, seems to imply that injunctions are more efficient when there is only one victim and one injurer. It should be pointed out, however, that this argument has been disputed--correctly in my opinion--by Ellickson, supra, at 743-47; see note 8 infra. Calabresi and Melamed are more explicit, id. at 1106-10, 1119-21, that damage remedies tend to be more efficient when there are many victims. More recently, Calabresi has come out more strongly in favor of damage remedies:

> [The damage remedy is] a device for promoting clearly collective goals..., while still permitting a wide degree of atomistic choice and determination...[T]he next century will be the century not of contracts nor of criminal law...but of torts and of the [use of damage remedies].

Calabresi, Torts--The Law of the Mixed Society, in American Law: The Third Century 103, 112-13 (B. Schwartz ed. 1976) (footnote omitted).

R. Posner, Economic Analysis of Law (2d ed. 1977), argues that damage remedies should be used when "transaction costs" are high and that injunctive remedies should be used when such costs are low. Id. at 51. He notes that transaction costs are highest when there is one injurer and many victims, but that transaction costs "may be quite high" even when there is just one injurer and one victim (because of strategic behavior). Id at 45.

Michelman, Pollution as a Tort: A Non-Accidental Perspective on Calabresi's Costs, 80 Yale L. J. 647, 669-73 (1971), concludes that when there is one injurer and many victims, damage remedies should probably be used unless the efficient outcome is for the injurer's activity to be enjoined (that is, when the injurer is the "cheapest cost avoider"). Id. at 672. He does not consider the case of one injurer and one victim.

There are some recent commentators who seem to prefer (or are at least much more sympathetic towards) the injunctive remedy. See, e.g., Note, Injunction Negotiations: An Economic, Moral, and Legal Analysis, 27 Stanford L. Rev. 1563, 1567-68, 1569 n.24 (1975) (arguing that injunctions are more efficient than damages when the measure of damages understates the plaintiff's true damages and the efficient outcome is for the defendant's activity to be enjoined) [hereinafter cited as Note, Injunction Negotiations], and O. Fiss, The Civil Rights Injuction 74-80 (1978). See also Comment, Equity and the Eco-System: Can Injunctions Clear the Air?, 68 Mich. L. Rev. 1254 (1970).

6/ Since historically both injunctive and damage remedies have been available in nuisance cases, Restatement (Second) of Torts § 821D (Comment a) (1965), it is not possible to generalize accurately about trends without an empirical investigation of the decisions over many years. However, most commentators believe that damage remedies are being used increasingly by American courts. The following "capsule history" of judicial practices in nuisance cases is representative of this view:

> At common law, courts traditionally granted injunctive relief (rather than damages) upon a showing that the defendant interferred unreasonably with the plaintiff's enjoyment of his or her own land... Courts gradually became aware that the costs to society of enforcing injunctions might exceed the true costs of the harms they remedied; but rather than shift to a damage remedy, courts responded by refusing to find nuisances at all when the harm resulted from activities that were socially beneficial. More recently, however, courts have begun to recognize the appropriateness of damage remedies...

Note, Efficient Land Use and the Internalization of Beneficial Spillovers: An Economic and Legal Analysis, 31 Stanford L. Rev. 457, 464-65 (1979) (footnotes omitted).

See also Rabin, supra note 5, at 1300 n.4 (referring to "...the trend toward awarding damages rather than an injunction in nuisance cases..."), and Note, Injunction Negotations, supra note 5, at 1566 n.13 (mentioning "[t]he preference of today's court system for damages over injunctive relief...").

The leading modern American cases illustrating the use of damage remedies are Boomer v. Atlantic Cement Co., 26 N.Y.2d 219, 257 N.E.2d 870, 309 N.Y.S.2d 312 (1970), and Spur Indus., Inc. v. Del E. Webb Dev. Co., 108

Ariz. 178, 494 P.2d 700 (1972). The precedential value of the Boomer decision is in some doubt as a result of Copart Industries, Inc. v. Consolidated Edison Co., 41 N.Y.2d 564, 362 N.E.2d 968, 394 N.Y.S.2d 169 (1977).

In England, there is apparently a stronger preference for injunctions relative to damages. See Ogus & Richardson, Economics and the Environment: A Study of Private Nuisance, 36 Cambridge L. J. 284, 309 (referring to "the clear English judicial preference for [injunctions] over [damages]"). Recently, however, there may have been "[s]ome easing in the judicial attitude" with regard to this preference. Id. at 310, citing Miller v. Jackson and Another, [1977] 3 W.L.R. 20.

7/ These three arguments have not to my knowledge been stated in any one place, although each has been made explicitly. See note 8 infra.

8/ The preference by recent legal commentators for damage remedies, supra note 5, is based primarily on the strategic behavior argument and secondarily on the bonus payment argument. For examples of the former argument, see Calabresi & Melamed, supra note 4, at 1106-07, 1119 (discussing "holdout" and "freeloader" problems when there is one injurer and many victims), and Ellickson, supra note 5, at 742-47 (discussing the same problems when there is one or many victims). Although Calabresi and Melamed seem to believe that strategic behavior problems only arise when there are many victims (or many injurers), Ellickson has pointed out that strategic behavior problems can also arise when there is only one injurer and one victim. This point has also been emphasized, for example, by Regan, The Problem of Social Cost Revisited, 15 J. Law & Econ. 427, 428-32 (1972), and by Cooter, The Cost of Believing Coase's Theorem, Working Paper No. 76, Dept. of Econ., Univ. of Calif. at Berkeley, Nov. 1976. See also R. Posner, supra note 5, at 45. For an example of the bonus payment argument, see

Calabresi & Melamed, supra note 4, at 1110, 1121. The term "bonus payment" is due to Ellickson, supra note 5, at 735-37, although he uses the term somewhat differently than here. As Ellickson uses it, a bonus payment is to be added to an "objective" market value measure of damages in order to more closely approximate the actual "subjective" damages suffered by the plaintiff. In his view, these payments "could be defined through legislated schedules, perhaps as specific percentages of the market value award," id. at 736. Thus, if one wanted to pursue a distributional goal through the damage award, one could use a smaller or larger percentage.

Some earlier legal commentators who preferred the damage remedy based their case primarily on the extortion argument. See, e.g., Keeton & Morris, Notes on "Balancing the Equities," 18 Texas L. Rev. 412 (1940).

The increasing judicial preference for damage remedies, to the extent that there is a trend, supra note 6, seems to be based on the extortion and strategic behavior arguments. The former argument is embodied in the equitable hardship doctrine, which states that if there is scope for substantial extortion under the injunctive remedy, it should not be used (even if alternative remedies result in too little compensation). See Note, Injunction Negotiations, supra note 5, at 1577 ("Virtually every United States legal jurisdiction has turned to the equitable hardship doctrine as a cure for the "extortion" problem, and its use is still growing;" footnote omitted). The strategic behavior argument is illustrated, for example, in Boomer v. Atlantic Cement Co., 26 N.Y.2d 219, 257 N.E.2d 870, 309 N.Y.S.2d 312 (1970). The court explicitly assumed that if an injunction were granted to the plaintiffs, they would not settle the case despite the fact that their damages were $185,000 and the defendant's investment in his plant was $45,000,000. Id. at 225, 257, N.E.2d at 873, 309

N.Y.S.2d at 316-17. The strategic behavior argument is also implicit in the defense to an injunction that the plaintiff acted in bad faith or for the purpose of a "vexatious lawsuit." See W. Prosser, Handbook of the Law of Torts 611 (4th ed. 1971), citing Edwards v. Allovez Mining Co., 38 Mich. 46 (1879) and Abdella v. Smith, 34 Wis. 2d 393, 149 N.W.2d 537 (1967).

9/ These are the same goals adopted by Calabresi & Melamed, supra note 4, at 1093-1101. Although they also discuss "other justice reasons," id. at 1102-05, they "admit that it is hard to know what content can be poured into that term, at least given the very broad definitions of economic efficiency and distributional goals that we have used," id. at 1102. For an interesting discussion of nuisance law based on principles of "corrective justice" ("rendering to each person whatever redress is required because of the violation of his rights by others"), see Epstein, Nuisance Law: Corrective Justice and Its Utilitarian Constraints, 8 J. Legal Studies 49, 50 (1979). See also Ogus & Richardson, supra note 6, at 317-23, and see generally R. Stewart & J. Krier, Environmental Law and Policy: Readings, Materials and Notes 168-97 (2d ed. 1978).

10/ See, e.g., R. Musgrave & P. Musgrave, Public Finance in Theory and Practice 691-94 (1973).

11/ See, e.g., Note, An Economic Analysis of Land Use Conflicts, 21 Stanford L. Rev. 293 (1969), and Starrett & Zeckhauser, Treating External Diseconomies--Markets or Taxes?, in Statistical and Mathematical Aspects of Pollution Problems 65, 72-82 (J. Pratt ed. 1974).

12/ In order to justify this assumption, it is necessary to assume that the parties have special reasons for wanting to be at their present locations (for example, due to specialized production advantages or locational

amenities) and that they therefore are willing to pay the most to be there regardless of how the nuisance dispute is resolved. Otherwise, it would be necessary to consider the possibility of "entry" of other parties or of "exit" of the existing parties, thereby greatly complicating the discussion. For analyses of injunctions and damages when the efficient solution involves entry or exit, see Frech, The Extended Coase Theorem and Long Run Equilibrium: The Nonequivalence of Liability Rules and Property Rights, 17 Econ. Inquiry 254 (1979) (entry and exit of both injurers and victims when the parties do not bargain with each other), and Polinsky, Controlling Externalities, supra note 1 (exit of the victim when the parties do bargain with each other).

13/ In many realistic situations of this sort, there are other non-represented "parties" such as nearby communities dependent on the factory's employment. See, e.g., Michelman, supra note 5, at 681-83, and R. Stewart & J. Krier, supra note 9, at 230, 245. The issues raised by the existence of such parties are not discussed in this essay.

14/ For expositional reasons, I will refer to this output as the efficient one even though this may not be strictly correct. See note 18 infra.

15/ This, of course, assumes that the factory has no fixed costs and that there are no fixed damages.

16/ See text at notes 17-18 infra.

17/ See note 14 supra.

18/ For expositional simplicity, I will treat the distributional issues as distinct from the efficiency issues even though this is strictly correct only if income can be costlessly redistributed between the parties. See, e.g., Polinsky, Economic Analysis as a Potentially Defective Product: A Buyer's Guide to Posner's Economic Analysis of Law, 87 Harv. L. Rev. 1655, 1665-69, 1676-80 (1974).

19/ See, e.g., Section VI infra.

20/ See note 31 infra and accompanying text.

21/ Under circumstances different from the ones assumed here, it may not be desirable to sacrifice efficiency to promote distributional goals through the choice of a legal rule. See Shavell, A Note on Efficiency vs. Equity in Legal Rulemaking: Should Equity Matter Given Optimal Income Taxation?, unpublished manuscript, Dept. of Econ., Harvard Univ., Aug. 1979. But see Kronman, Distributive Justice, Libertarianism and the Law of Contracts, unpublished manuscript, Yale Law School, Sept. 1979.

22/ See, e.g., Calabresi & Melamed, supra note 4, and Ellickson, supra note 5, at 738-48.

23/ Spur. Indus., Inc. v. Del E. Webb Dev. Co., 108 Ariz. 178, 494 P.2d 700 (1972).

24/ What I am referring to is called "rule four" by Calabresi & Melamed, supra note 4, at 1116, a "compensated injunction" by Ellickson, supra note 5, at 738 n.202, and a "conditional injunction" by Rabin, supra note 5, at 1300. Despite Ellickson's and Rabin's inclusion of the word "injunction" in their terminology, their definition of the remedy clearly makes it a form of damage remedy.

25/ This seems to be the position of the Restatement (Second) of Torts (1965). The "reasonableness" standard in intentional private nuisances limits the circumstances in which liability for harm is imposed. Id. at §826, Comment b. R. Stewart & J. Krier, supra note 9, suggest that the reasonableness standard might be interpreted as (in my terminology) defining an entitlement corresponding to the efficient output. Id. at 225-26. For an example of an intermediate entitlement in practice, see Smith v. Staso Milling Co., 18 F.2d 736 (2d Cir. 1927) (allowing a limited amount of dust from defendant's slate crushing mill).

26/ See generally Calabresi & Melamed, supra note 4, Ellickson, supra note 5, at 738-48, and Rabin, supra note 5.

There is also a fourth possibility that has not been referred to in the text--a damage remedy working in both directions. To my knowledge, this remedy has not been considered by courts or legal commentators. Since it turns out in most of the situations considered in this essay not to be helpful, I will ignore it.

27/ This setting essentially corresponds to that assumed by the "Coase Theorem" with zero transaction costs. Coase, The Problem of Social Cost, 3 J. Law & Econ. 1 (1960). See also Calabresi, Transaction Costs, Resource Allocation and Liability Rules--A Comment, 11 J. Law & Econ. 67 (1968).

28/ Litigation may be explained by other factors besides strategic behavior, such as different expectations about winning the case.

29/ To make the points I want to make, it is only necessary to assume that they fail to reach an agreement at the earliest possible opportunity. The delay due to strategic behavior is a permanent loss even if the parties eventually resolve the dispute efficiently.

30/ If liability were less than actual damages beyond the efficient output, the factory would have an incentive to threaten to produce beyond its after-liability profit maximizing output (which in turn would be beyond the efficient output).

31/ See, e.g., the discussion in Polinsky, supra note 18, at 1676-78, and the references cited.

32/ Since, with perfect information, the court could base transfers on criteria over which the parties have no control, it may seem peculiar to assume that the court cannot use lump-sum transfers. The assumptions made

in this section are useful pedagogically because they allow the effects of costly redistribution to be understood most simply. Moreover, as an institutional matter, courts are not allowed to engage explicitly in general redistribution.

33/ This is demonstrated formally in Polinsky, On the Choice, supra note 1, at ---.

34/ The same would be true if liability were to exceed the factory's profits.

35/ See Calabresi & Melamed, supra note 4, at 1119-21.

36/ See Calabresi & Melamed, supra note 4, at 1120-21, and R. Stewart & J. Krier, supra note 9, at 252.

37/ See, e.g., R. Stewart & J. Krier, supra note 9, at 201, 243, 283. See also 1 J. Bonbright, The Valuation of Property 14-16, 40-97, 269-97 (1937). It is, of course, possible that a court's estimate of the "objective" damages could be too high, leading to overcompensation.

38/ If, as assumed, the factory cannot produce more than seven units, then it would probably not carry out its last threat to produce the seventh unit since it loses by doing this and gains nothing in credibility regarding threats to produce additional units. However, imagine that the factory could produce eight or more units, but that the parties end up with seven being produced.

39/ This net loss can also be determined by subtracting the factory's pre-liability profits of $35,000 from the resident's pre-compensation damages of $49,000. The liability payments do not affect the net loss since what one party gains the other loses.

40/ The validity of this statement presumes an "individualistic" social welfare function, that is, one in which social welfare increases if any one

individual's welfare improves and no one else is made worse off. This kind of social welfare function is frequently assumed by economists.

41/ This argument is developed in Polinsky, On the Choice, supra note 1, at ---.

42/ The case of one injurer and one victim may also be relevant if the interests of the victims are aggregated through a public official, as in a parens patriae proceeding. The official, rather than a private representative, is then in a bargaining situation with the injurer (or injurers' representative). The terms of an out-of-court settlement would correspond to the private bargaining outcome discussed in this essay.

43/ See, e.g., Ellickson, supra note 5, at 761-79; Michelman, supra note 5, at 666-80, and R. Stewart & J. Krier, supra note 9, at 255-324. But see Comment, Equity and the Eco-System: Can Injunctions Clear The Air?, supra note 5, at 1259-62.

When the victims' interests cannot be aggregated, the analysis of one victim and one injurer may still be relevant to some extent. For example, even when actions are brought by public officials for public nuisances, private individuals who suffer harms of a different kind may bring private actions. See Restatement (Second) of Torts § 821C (1965).

44/ If the entitlement is to the right of the efficient output, it is the defendant who does the extorting. He may obtain compensation (possibly far) in excess of his actual reduction in profits.

45/ Regardless of whether there is one or many victims, this general conclusion would be true even if efficiency were the only goal. See Sections VIII-IX supra.