ECONOMIC ISSUES RAISED BY TREATMENT OF TAKINGS UNDER NAFTA CHAPTER 11

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1. INTRODUCTION

This working paper examines, from an economic perspective, the treatment of takings (property rights) under NAFTA Chapter 11. To be more precise, the paper examines the treatment of takings as environmental groups fear might be established as the result of investor dispute settlement under this chapter; as of the date of this writing, most of the cases that have the potential to be precedent-setting have not been finally decided, albeit one—the Metalclad case—has been decided in a way that is unsettling to environmentalists.[1] The author attempts to determine whether requiring public compensation of private investors for diminishment of value resulting from government regulatory action has the potential of achieving anything close to an "optimal" outcome from a societal cost-benefit point of view (defined below). This determination makes use of tools of economic analysis and, in particular, Coase's theorem regarding achieving optimal outcomes where negative externalities are present.[2] The overall conclusion is that, although Coase's theorem can be invoked to argue that such an outcome can be achieved either via a "polluter pays" approach or a "public pays" (or "public must compensate") approach, as a matter of practical application, the first approach is preferable to the second for a number of reasons, including government "fiscal illusion" and "moral hazard."

Section 2 of this paper reviews Coase's theorem and establishes the main result that follows from it: if a bargaining process can be established and properly managed under the right circumstances, either of the two approaches noted above can in principle yield the same outcome in terms of achievement of a goal to reduce an external cost. As is well known, the two approaches do yield differing results with respect to who actually bears the costs associated with this reduction. Sections 3 and 4 then discuss respectively the issues posed by fiscal illusion and moral hazard; the conclusion in each is the same—that

[1] A number of disputes, e.g., most importantly the cases commonly called "Metalclad" and "Methanex", have been lodged under NAFTA Chapter 11 part 2 (establishing the investor to state dispute settlement procedures) where the complaint of the investor is that regulations promulgated by relevant governments or government agencies have resulted in diminished value of investments that is tantamount to expropriation as per NAFTA article 1110.1.b and hence subject to requirements for compensation under articles 1110.1.d and 1110.2 - 1110.6. A final decision has not been rendered on Methanex, arguably the most important of the cases. In the case of Metalclad, the dispute settlement tribunal decided in favor of the company. Although the decision per se is unsettling to the environmental community, what worries the environmentalists most of all is the reasoning of the tribunal, which held that the decision by the government of Sonora (a state of Mexico) to disallow the company from operating a toxic waste disposal site there was tantamount to an expropriation because of "significance of impact" (or, otherwise put, because the company lost all or most of the value of its investment because of the disallowance, without taking into account that the motive of the decision was to prevent environmental harm, not necessarily to expropriate the property).

On these issues, see Mann and von Moltke 2002. Complete descriptions of outstanding disputes submitted to dispute settlement under NAFTA 11 are found at http://www.naftalaw.org.

[2] Coase 1960.

in spite of the neutrality in principle of Coase's result regarding the best direction for public policy to take with respect to whether to assess the polluter or the public for costs of pollution abatement, the former dominates the latter when issues of practicability are considered. The overall conclusion then is that, although the case for public compensation of investors for diminished value of investments induced by environmentally motivated regulations is not wholly without merit, as a practical matter, application of the "polluter pays" principle is preferable. To the extent that this is correct, it is also arguable that use of NAFTA Chapter 11 as a vehicle to force such compensation for such diminished value is likely to lead to nonoptimal results.[3] This of course would suggest that the expropriation provisions of NAFTA Chapter 11 should be interpreted, or perhaps even amended, so that these would not cover this type of taking; this matter is discussed in the concluding section (section 5).

2. COASE'S THEOREM ON EXTERNAL COSTS

From an economic perspective, environmental problems originate, or at least so to a large extent, from "market failure," i.e., a situation where the working of a market, even one in which most of the standard conditions for optimality would seem to be met, fails to create a socially optimum outcome. These standard conditions for optimality include that the market be characterized by something approaching perfect competition, which in practical terms means that no seller or buyer in the market has market power (i.e., can unilaterally affect the price or quantity of the good or service being sold in the market), and that no buyer or seller possesses information bearing on the market not possessed by other buyers and sellers that can be used as the basis for gaining advantage.

Under most circumstances, if these conditions are present, a market will produce an optimal outcome in the sense that consumer surplus minus total costs will be maximized when a market-clearing price and quantity are achieved. This is equivalent to saying that, on a social benefit-cost basis, total benefit is maximized. The details of how and why this happens are explained in any standard textbook on microeconomics and thus further explanation is omitted here. Market failure can of course result if sellers or buyers are able to exert market power; however this is not the topic here.

Rather, we are concerned about market failure that results from a "negative externality" associated with use of a public good.[4] If present, such an externality results in total costs associated with

[3] This remark does not apply when the clear intent of the government measure is to expropriate a property but, rather, it applies only to cases where the intent is to achieve a legitimate environmental goal. Admittedly, there could be "grey" cases, e.g., where the intent of a government is not clear or where expropriatory intent is disguised as a legitimate environmental goal.

[4] For purposes here, we shall define a public good as one that is available for use by any user such that, in the absence of specific governmental measures to the contrary, its use is free of charge. More precisely, economists note that public goods are characterized by (1) lack of "rivalry", i.e., the use and enjoyment of the good by one person

the buying and selling of a good exceeding the costs that are borne privately by sellers. Such an externality (or, equivalently, an "external cost") could occur in the form of harm to the environment, e.g., as the result of an increase in air pollution that causes degradation in human health (or, also, degradation in the health of forests or wildlife).

Suppose, for example, that air pollution, measured in units of total emission of pollutant *u* (where *u* is interpreted as a total of *u* units of pollution), creates total external costs as represented in curve PP in figure 1. Note that these are indeed external costs and not the costs associated with the production of some product; costs of the latter sort also are incurred, but are private ("internal") costs. The PP curve not only rises with the total amount of emission, but it also rises with increasing slope. This "rise at an increasing rate" occurs because, as total emission of the pollutant grows, the total external costs created by it increase at an increasing rate (if the amount of pollutant released into the air is doubled, for example, this is likely to result in more than double the number of pollution-related illnesses). Removal of these costs creates a benefit to society that is, in magnitude, exactly the same as the cost.

Another curve—the AA curve—is indicated on the same figure. It indicates the total cost of reducing the pollution to level *u*, given some initial level of pollution. This cost would be expected to rise as a function of how much pollutant is removed from the air and, thus, because removal of pollutant is the inverse of emission of pollutant, on this figure the AA curve falls as the total amount of such emission increases. This fall is at a decreasing rate (the slope gets flatter as total emission increases) because the marginal cost of cutting out an additional unit of pollution rises as total emission of pollution is cut back.

The optimal output is that which minimizes total cost, where this total cost is the sum of the AA and the PP curves. This sum is given by the TT curve, and it is, as drawn, U-shaped.[5] As can be seen from the figure, this minimum is reached at point u^*, which is in fact where the slopes of the AA and the PP curves are equal in magnitude.[6] To the right of this point, e.g., at point u^H, adding a unit of pollution

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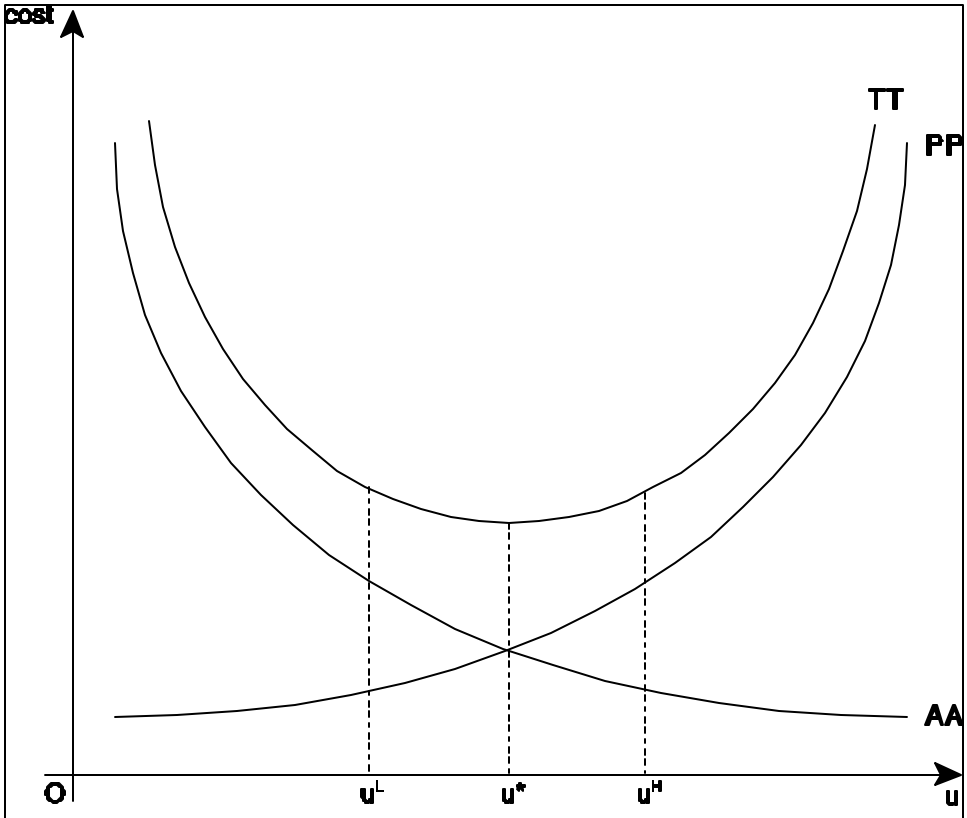
does not diminish the supply and enjoyment available to any other person and (2) no party can appropriate the good for personal gain, or at least not in the absence of a government measure enabling such an appropriation. For the particular public good used to illustrate much of what follows, the air, these two conditions are only approximately met but this approximation is "close enough" (the supply of air is finite, but for all practical purposes my use of the air does not diminish the supply of air needed by my neighbor, and I certainly am not able to sell this air for profit).

[5] This shape is likely, given the shapes of the PP and AA curves, but is not inevitable. See footnote 4.

[6] Let total costs, as a function of total amount of pollution u, be given by $T(u) = A(u) + P(u)$, where A and P are the AA and PP curves described in the text, which we assume to be C_2 functions (continuous and differentiable, with continuous derivatives). A necessary condition for T(u) to be a minimum at some u that is not at either of the end-points of the domain of values taken on by u is that $dT/du = 0$, which can be true only if $dA/du = -dP/du$. Given that A and P slope in opposite directions and that the magnitude of dA/du increases with increasing u while the magnitude of dP/du diminishes with increasing u, this condition is likely to be met. Even if it is not met, the strict convexity of T (it is strictly convex because the second derivative of T with respect to u, d^2T/du^2, is strictly positive) guarantees that a local minimum does exist. If the condition $dA/du = -dP/du$ is not met, the minimum will occur at one (but not both) of the end points of the domain of u.

increases external costs by an amount greater than the cost of abating that unit. But, to the left of u^*, e.g., at point u^L, reducing a unit of pollution costs more than the benefit that is gained from a reduction in the external cost associated with this unit of pollution.

Figure 1 External costs associated with use of a public good (unpolluted air), and private costs associated with reducing the use of this good (reducing the amount of pollution)



PP = social external cost of pollution at level u
AA = cost of reduction of pollution to level u
TT = sum of PP and AA
u^* = optimal level of emission
u^H = TT can be reduced by moving to u^*; this raises cost of reduction of emission but this cost is more than offset by reduction of the social external cost of emission
u^L = TT can be reduced by moving to u^*; this raises social external cost of emission but this is more than offset by reduction in cost of reduction of emission

But, if u^* indeed is the optimum level of pollution, in the sense that net benefit is maximized at this point, the question remains—how to get to u^*? Ronald Coase suggested in an article published more than 40 years ago (see footnote 2) that two approaches would work. In the first approach, property rights to the air would be assigned to society at large, so that holders of these rights, members of the general public, could in effect sell the right to pollute to producers. Suppose that, at the moment that these rights were established, the actual level of pollution was u^H. In order to continue in production, polluters must either (1) acquire property rights for use of the air and, by buying these rights, compensate the public for the costs that the pollution forced citizens to incur, or (2) undertake pollution abatement, so that the public's property rights are not violated. As long as pollution levels were currently above u^* (which is in fact so, by assumption), it would in fact be cheaper for the polluters to abate their pollution than to buy property rights, assuming that the public would sell these rights for no less than the costs created by the pollution. But, once pollution is reduced to u^*, a crossover point is reached, where further abatement costs more than purchase of property rights, or at least so if the rights are priced at the same level as the external costs. The least cost strategy for polluters would thus be to reduce pollution to u^* and then to buy from the public the right to pollute at this level.

Alternatively, property rights to use of the air, even as a garbage dump, could be assigned to the polluters, but polluters could be required to forego pollution if these rights were bought by the public. Under this approach, if at the time that this right is assigned the actual level of pollution were again to be u^H, citizens could organize to buy from the polluters enough rights to force the polluters to reduce emissions to u^*. As long as the price paid for these rights were at least as great as the cost of the abatement, the firm should be eager (or at least indifferent) to selling the rights and incurring the abatement costs. Because the cost of reducing pollution from u^H to u^* remains less than the external cost borne by citizens at u^H, citizens should be willing to pay a price equal to the cost of abatement. But once u^* is attained, the cost of further abatement (which now must be borne by the public) becomes greater than the costs associated with enduring this level of pollution. Therefore, the public might be expected to buy rights to clean air until the level u^* is attained, but not to buy rights to drive pollution below u^*.

Thus, by Coase's logic, the optimum u^* can be reached by assigning a property right to air either to the public or to the polluter. The two approaches of course do have differing implications for the one who bears the cost of pollution abatement, the polluter or the public. Even so, the point established by Coase is that, under either approach, the optimum can be achieved.

The issue of who pays the costs of abatement is important, of course. If property rights to the air belong to the public, it is the polluter who must pay these costs (and this is essentially the same as the

"polluter pays" principle and variants on it, such as "cap and trade").[7] If, by contrast, the property rights to the air belong to the users of the air (the polluters), the public must pay them in exchange for them taking action that reduces external costs. Given that someone must pay for the reduction of pollution, it becomes a matter of social choice as to who exactly pays.

There is a practical problem of how to determine the external cost borne by a member of society as the result of pollution. This is at best difficult and the determination can depend upon values of members of society that differ from member to member.[8] Coase had in mind that each member of society would know with some precision what the cost to her or him of pollution actually is, such that he or she could then, armed with this knowledge, bargain with the polluters over the price to be paid for exchange of property rights. The polluters also are assumed to be knowledgeable with respect to the precise external costs associated with pollution. If both sides are thus knowledgeable, a bargaining process might indeed lead to an outcome whereby the "right" price would be established by which exchange of property rights would result in an optimal level of pollution.[9]

However, in reality, most persons probably have no real idea of the cost to them of breathing polluted air; indeed, if they did, many people might choose to live someplace other than where they currently do! And, also, it is quite plausible that polluters are similarly ignorant about the external costs created by their pollution, even if they might claim otherwise.

Even if both the external costs of pollution and the costs of abatement were accurately known both to polluters and the public, to organize the trading of pollution rights so as to achieve the optimum, irrespective of who initially held these, might itself prove to be quite costly or even ineffective. This is why this requires a little more than imagination: suppose that property rights were given to the polluters for the air over Los Angeles, California, and then a public auction were to be held whereby (it was hoped)

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[7] Note that in the example given above, if property rights to the air are given to the public, the polluter not only must pay for abatement to bring pollution to level u*, but also must compensate the public for creating even this amount of pollution. However, as is elaborated upon shortly, if it is the polluter who pays, the cost is in fact likely to be reflected in a higher price of the relevant product if the pollution is created by production of the product. In this instance, at least some of the cost of pollution reduction is passed on to buyers of the product, who are themselves members of the public. Thus, in this latter instance, the issue of "who pays" comes down, to some large extent, to "exactly which members of the public pay".

[8] For example, although a resident of Washington, DC, the author is a native of California. As such, he highly values pristine redwood forests and assesses that the external cost of loss of these forests to timbering far exceeds the value of the picnic tables that would be made from the felled trees. Ronald Reagan, a non-native of California, was some time ago elected governor of that state. It is clear that he held different values, as he allowed vast stands of redwood trees to be cut in order to be made into picnic tables. A proper valuation of the external costs associated with loss of redwood forests must take into account both the preferences of this author and those of former Governor Reagan and, indeed, all others who might be affected by the loss. While this is theoretically possible to do, in practice it is at best very difficult.

[9] This assumes that the bargaining process itself is costless, which might not be the case. Rather, bargaining transactions costs could be significant. See paragraph that follows.

trading of rights would lead to an optimal outcome. All polluters and all citizens would be required to come to this auction. A very large tent would be needed. Collective action problems would almost surely occur. For example, citizen A might be willing to pay for cleaner air, but might hold back from bidding for clean air rights in the hope that these would be bought by his neighbors. Of course, if the neighbors did so, citizen A would get the benefit without having to pay his share of the cost. In order to prevent such "free riding" by individual citizens, some sort of complex mechanism would have to be agreed upon whereby the cost of property rights acquired by the public was shared by all members of the public, where account was taken of the possibility that the value of clean air might not be the same for all such members. Similar problems could be imagined if the property rights were held by the public initially. Given these problems, it has been suggested that, for anything like a Coasian bargaining process to work, an agent representing the public (e.g., the government) must do the bargaining and, where appropriate, the assessing of the public. It has been further suggested that, if property rights for clean air rest initially with the public, for an efficient outcome to be achieved, the best approach might be for the government to assess an effluent tax on polluters, or to sell pollution rights in some form of a "cap and trade" scheme.[10] The effluent tax is discussed below. Likewise, if the property rights rest initially with the polluters, the best approach might be for the government to require pollution to be reduced to the optimal level (assuming that this can be determined) and then to compensate relevant parties for abatement.

The analysis thus far is of the nature of a "partial equilibrium" analysis, i.e., the effect of pollution abatement on product prices is not considered.[11] But, if these prices change as the result of the trading of property rights to use of the air, these changes do have implications for social benefit. Because this matter is of some importance, we now explore it using some simplifications that are necessary to keep things manageable. Figure 2 is a modified version of a simple supply and demand schedule, where the DD curve represents demand for some product. Total social benefit created by sale of this product is measured by "consumer surplus," the area under the DD curve bounded by the Q axis and Q*. The SS curve represents total supply under an assumption that competition is "perfect" and marginal cost of production is constant with respect to total output; thus the price/cost axis intercept of this curve (at point C) is equal to the unit cost of production as borne by sellers of the product, and the SS curve is a horizontal line extending from this intercept.[12] The intersection of the SS and DD curves (at point A)

[10] Cap and trade schemes have been much discussed in the literature on environmental economics. For a recent contribution that discusses the outcome of implementation of such a scheme for emission of sulfur dioxide in the United States, see Ellerman et al. 2000.

[11] These costs might be embodied in the AA curve, but we will now consider them more explicitly.

[12] As is standard in this type of analysis, this cost includes components to give sellers a competitive rate of return on any capital they have invested in the selling of this product and to compensate them for their own, as well as their employee's, labor.

represents the price and quantity (P* and Q*) that both clear the market and maximize consumer surplus. Thus, also, in the absence of an external cost, these are the price and quantity at which net social benefit, i.e., total social benefits minus total social costs, is maximized. The latter, total social costs, are in this instance given by the area under the SS curve, bounded on the right by point A, and thus are given by the area of the rectangle OCAQ*. Net benefits equal total benefits minus total costs and are given by the area of the triangle CDA.

However, what again is at issue is that there is an external cost—one that is borne by the society rather than by sellers of the products—that must be accounted for. To account for this additional cost in a way that keeps things simple, let us assume that this cost increases by an equal increment E for every unit of the product sold in this market. In other words, we assume that each unit of production produces a constant amount of pollution and total external costs of the pollution increase linearly with pollution. (And, thus, we have dropped, in the interests of keeping things simple, the assumption used earlier that total external costs rise, as a function of total pollution, at an increasing rate. Also, the reader should note that, in this example, to reduce pollution, it is necessary to reduce output. This is by design; the goal here after all is to demonstrate welfare effects of changes in output.) Thus, the unit social cost is no longer equal to private cost but rather is equal to the marginal (private) cost C plus the unit external cost E, so that the social cost per unit of output is B, where B = C + E. Marginal social cost thus is given by the curve BB, which by virtue of the simplifying assumptions is constant with respect to output. Total social cost is given by the area under this curve, again bounded by the Q axis and the amount of the good that is bought and sold.

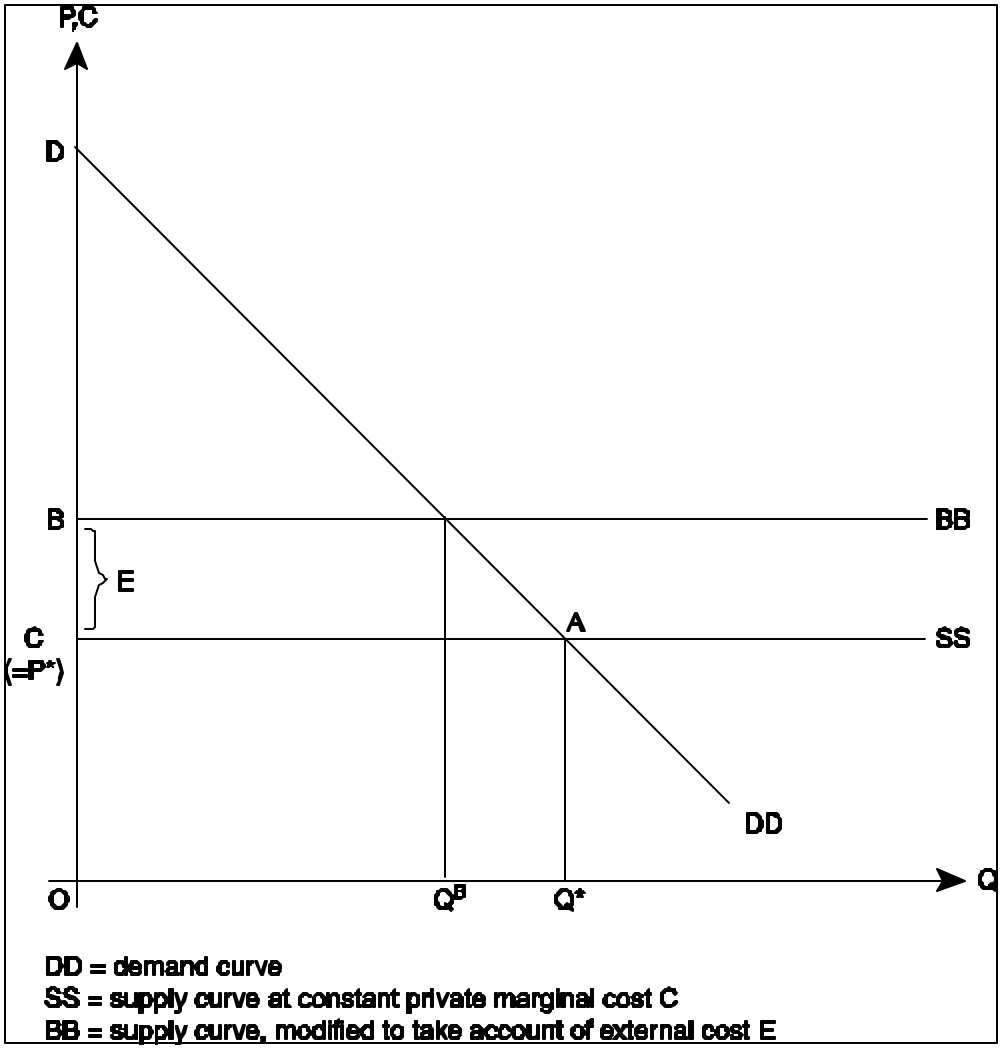
To maximize social benefits (which still equal consumer surplus) net of social cost, the quantity of the good bought and sold should now be Q^B, the quantity at which DD equals BB. One should note that Q^B is less than Q*, reflecting that the true cost of the good is not C but the higher B. By reducing the amount of the good bought and sold from Q* to Q^B, the amount of pollution is reduced, and external costs are reduced accordingly, to an optimal level.

An environmental purist might argue that, if sale of this good creates an environmental harm, societal interests dictate that its sale ought to be banned. In fact, this possibility is not precluded from this analysis. Figure 3 depicts a case where such a ban is warranted but where, in the absence of a ban or a measure equivalent to a ban, sales will proceed. In this instance, the total social cost of producing even one unit of the good, where that cost takes into account the environmental harm, exceeds any possible benefit achieved from sale and use of the good. The activist must recognize however that, in the absence of the external cost, there is a net benefit to producing the good; if there were no benefit, there would be no production under any circumstance. But production of the good should not take place if the true costs

of such production at any level of sales exceed any possible benefit. Picnic tables made from the wood of first-growth redwood trees come to mind (see footnote 6 above). There may be some benefit from such tables (they are attractive and durable), but this benefit is scant compared to the cost to society of loss of magnificent redwood groves.

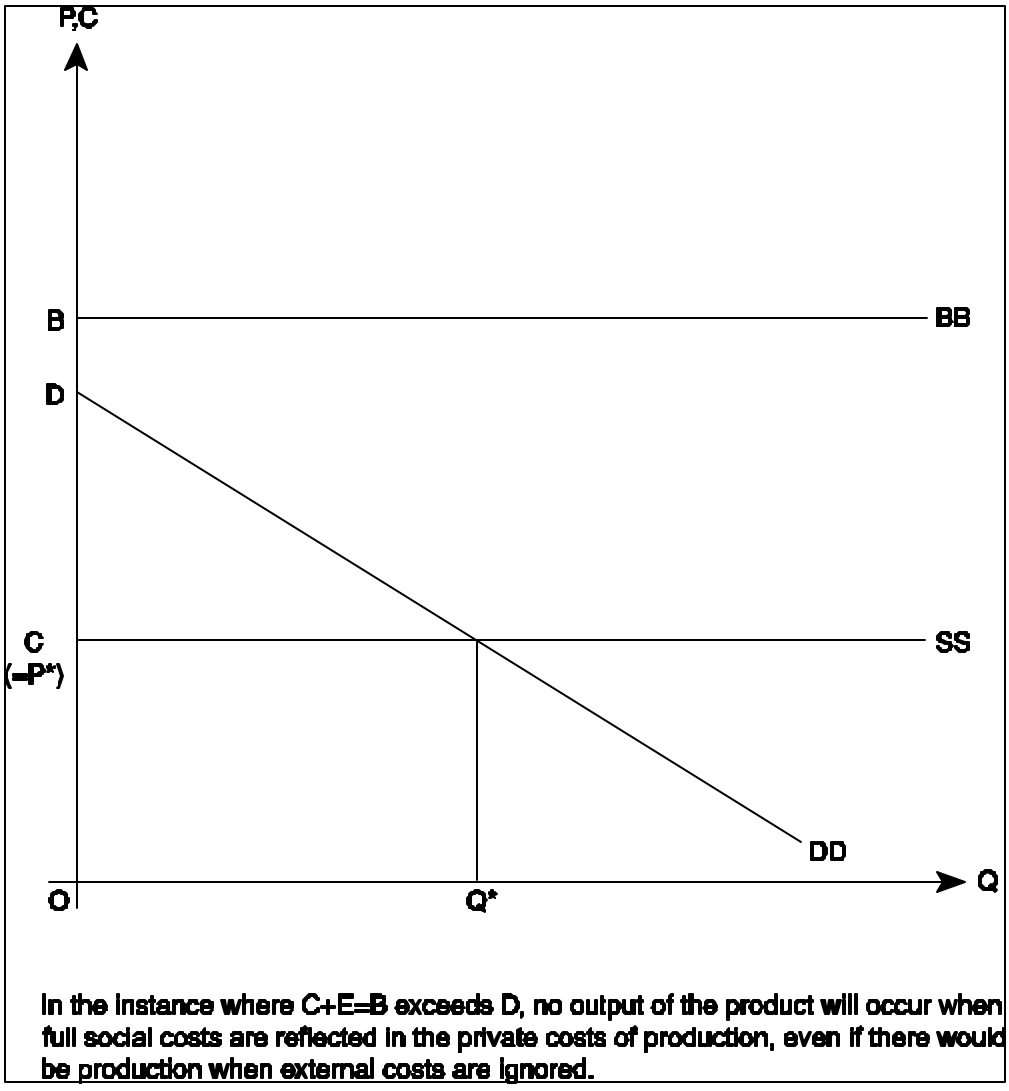
But how do we achieve the socially optimal quantity Q^B rather than the market-clearing quantity Q*? After all, left to its own devices, the market will deliver Q* and not Q^B. Again, we can make an appeal to the reasoning behind Coase's theorem.

Figure 2 Reaching the optimum price and quantity where an external cost is present



As before, there are in fact two ways to get to the desired equilibrium. Let us, in what follows and consistent with the first example, assume that the external cost in our example is attributable to air pollution. Again, one approach is to assign property rights to clean air to society at large, such that society can charge suppliers for use of this air as a place to dump their gaseous wastes, while an alternative approach is to assign property rights for use of the air to the suppliers, but to allow society at large to buy back some of these rights.

Figure 3 If total costs B, including both internal private costs and external social costs, exceed the reservation price D, there will be no output of the relevant product. Internalization of the external cost is equivalent to a ban on the production and sale of this product.



Consider first the case where property rights are assigned to society at large. In order to use the clean air (where to "use" the air means to dump effluent into it), the suppliers of the product must pay to acquire the right to pollute. As suggested above, a more practical means of achieving this payment and transfer of rights than Coasian bargaining might be that the government, acting on behalf of society, impose a tax on the suppliers for use of the air, and then to distribute revenues gained from this tax to members of society affected by the pollution.[13] An issue that then presents itself is, what price per unit of output (or rate of tax) is right? Clearly, to get to the equilibrium, this price/tax should be equal to (E-C), the external cost, so that (E-C) becomes fully internalized by the producers and an ordinary market clearing process yields the desired outcome. Fortuitously, for the holders of the property rights, (E-C) in fact is exactly the price that maximizes benefit to members of society. This becomes evident from the following considerations: If a price/tax less than (E-C) is charged, members of society are under-compensated for the external costs that they must bear (see figure 4). But, also, if a price/tax greater than (E-C) is charged, members of society will lose consumer surplus that is in excess of the revenue gained from the tax (see figure 5), such that total benefit to society is reduced. Only when (E-C) is charged is the sum of net benefit, i.e., consumer surplus plus revenue from the sale of the property right minus total social costs, maximized.

But a similar case can be made if property rights are granted to the suppliers. As long as the amount of the product offered on the market exceeds Q^B in figure 2, external costs borne by the public will exceed additional consumer surplus created by a lower price being offered than the price which clears the market at Q^B (see figure 5). Thus, there would be a net gain to society to paying suppliers an amount equal to Q^B x (E-C) to limit output to Q^B.[14] This could be done in two ways: by society paying the suppliers the amount Q^B x (E-C) in a lump sum, in exchange for which the suppliers would agree to limit supply to Q^B but to hold price at C. Alternatively, suppliers could agree to limit supply to Q^B, causing the price to rise to the new equilibrium (C+E), and to appropriate the amount Q^B x (E-C) as a rent.[15]

Thus, by Coase's reasoning, the same (and desired) outcome again is achieved either by assigning a property right to clean air to the general public and allowing this to be sold to suppliers who need this air in order to make a product which is desired by society or, alternatively, by assigning the property right

[13] Such a tax was in fact proposed by noted British economist Arthur C. Pigou early in the 20th century and hence is now commonly known as a "Pigovian tax".

[14] If quantity were to fall below Q^B, there would be a net loss of benefit due to lost consumer surplus, exactly as in the case described previously (see figure 4).

[15] The first possibility creates a condition of excess demand; that is, some consumers would be willing to buy the produce at the price C, but would be unable to obtain it. Under these circumstances, the product would have to be rationed. For this reason, economists would prefer the second possibility.

to the air to the suppliers but allowing society to compensate these in some manner for reduction of use of the right in order to meet a socially desired end (i.e., reduction of effluent).

Figure 4 If output Q^P is set above the socially optimal quantity Q^B, uncompensated external cost will exceed appropriable consumer surplus.

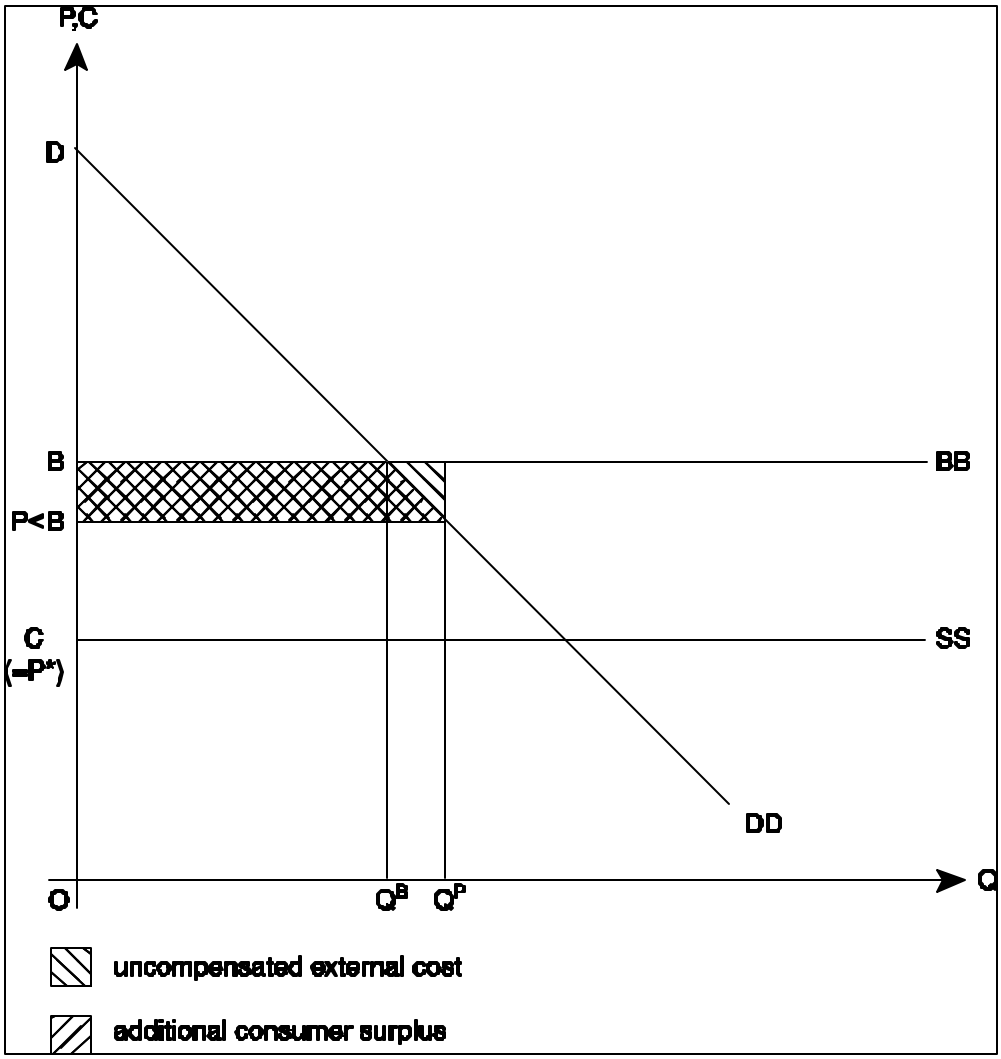
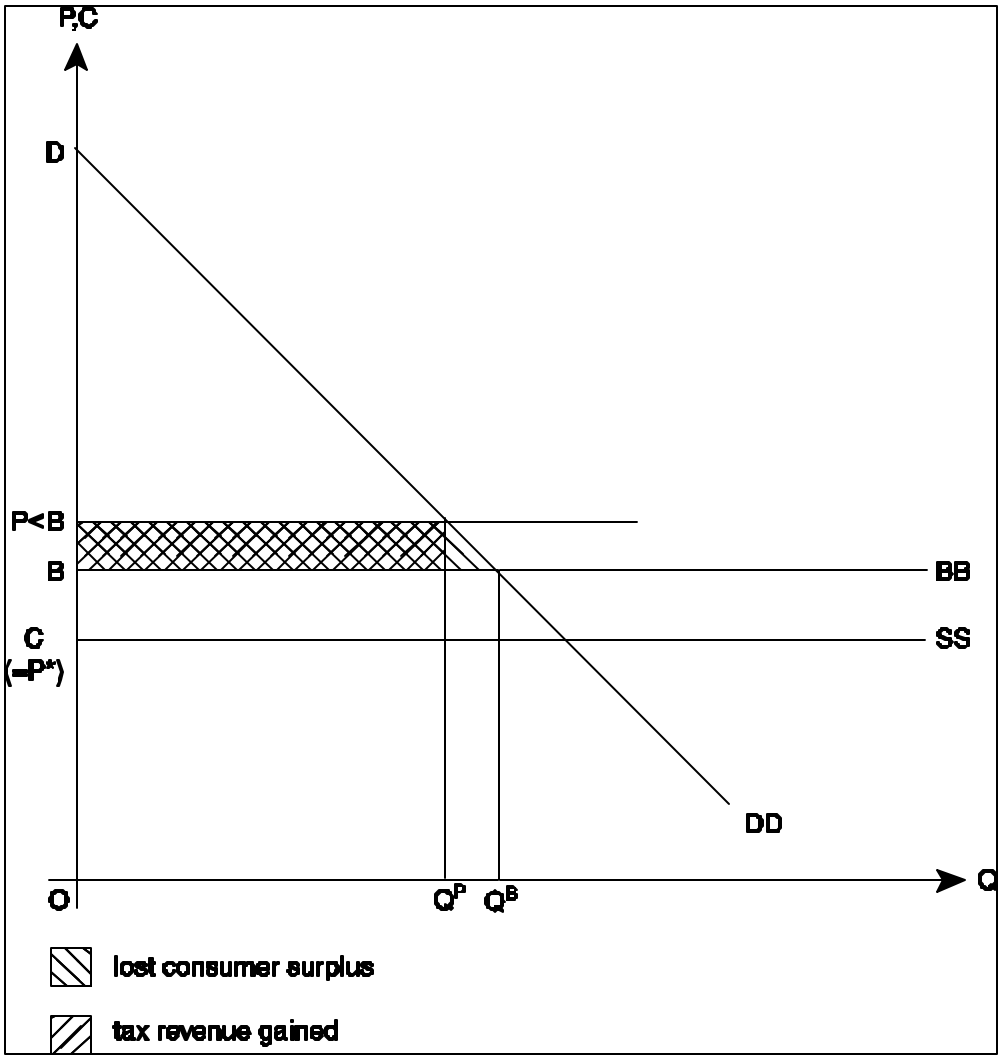


Figure 5 If output Q^P is set below the socially optimal Q^B, appropriable consumer surplus will be lost in excess of compensation of external cost.



As in the earlier example of figure 1, there is a big difference between the two assignments in terms of who ultimately pays in order to achieve the optimum level of output Q^B. In the present case, in both assignments, the achievement of the optimum is accomplished via a rise in price of the product and a consequent scale-back of production. Thus, in both assignments, the ultimate payer is the user of the product, who must pay a higher price for a more constrained quantity of this product. But, even so, if property rights are assigned to suppliers, all consumer surplus appropriated by them is retained by them. By contrast, where property rights are assigned to the general public, consumer surplus appropriated by

suppliers is returned to the general public in the form of tax revenue (or, in a cap and trade scheme, public revenue generated by initial sale of effluent rights).

In the usual spirit of Coasian analysis, this article could end here with a conclusion to the effect "polluter pays or public pays, the public must take its pick. But either approach will get society to a desired outcome". But we will not end here. Rather, we will examine two additional argumentations where both, if one accepts them (one might not!), lead to a conclusion that the better path, from an economics perspective, to achieving the desired outcome is "polluter pays".

3. FISCAL ILLUSION

An argument made by those who oppose the implicit granting of ownership rights to what otherwise are considered "public goods" to suppliers is as follows: if diminishment of value of an investment resulting from a regulatory action by a government requires compensation to the investor by the government, the effect of this requirement will be to reduce significantly the willingness of governments to pass and enforce needed environmental and health regulations. Does this argumentation have any economic validity?

The argument is, in effect, an appeal to the idea of "fiscal illusion." Boiled to its essence, fiscal illusion occurs when a government evaluates whether to pursue an action on the basis of budget cost to the government rather than on the basis of whether the action will create net social benefit. A very real example where fiscal illusion is, in fact, official policy is to be found in US trade policy. Under the Gramm-Rudman Act, any law or measure that affects the revenues or expenses to the US government must be either revenue neutral or, if the law reduces revenue or increases expenses, must make provisions to offset these gains or losses. This applies to tariff reduction, which almost always will result in revenue reduction (although the case might be found where elasticity of demand for a particular import is high enough that tariff reduction actually causes demand to increase enough to cause total revenues to expand, this in practice happens rarely if ever). But, by standard economic analysis, reduction of tariffs almost always results in net social welfare gains for the United States, even after taking into account loss of tariff revenue; in fact, this loss almost always is recaptured in the form of additional consumer surplus, which is, as noted, a social benefit. Thus, the fact that US law requires that tariff reductions be accompanied by other measures to recover lost tariff revenue does indicate that this law embodies some element of fiscal illusion.

But, to be fair and balanced, it must be noted that fiscal illusion can cut two ways. For example, in the United States, business groups have long argued that some environmental regulation has been passed that has created costs of compliance in excess of benefits generated. In evaluating this regulation,

or so it is argued, the government took account of benefits but ignored costs (in effect, the government analysts would have taken into account movement to the left along the PP curve in figure 1 but ignored the AA curve) in deciding what should be the amount of a particular pollutant allowed to be emitted. If the government actually does behave in this way, then this represents a form of fiscal illusion in the following sense: in making a cost/benefit determination, private costs are ignored and only government budgetary costs are accounted for.

Fiscal illusion therefore does not always necessarily lead to underregulation; it can lead to overregulation as well. If such overregulation does occur as a result of fiscal illusion, then "socialization" of private costs via public compensation of private entities for costs these entities must bear in order to comply with the regulation will, as per Coase's theorem, lead to better outcomes than will decisions made without such compensation. This is because, in effect, the requirement for compensation implicitly does assign a property right for the public good to private entities that use that good, such that government then must compensate them for what amounts to a taking away of some of the right to use that public good. In determining the optimal level of taking, if the government does face a requirement to compensate, it will balance social benefits achieved by the taking against the (now public) costs of doing so. In principle at least, the outcome should be something akin to attaining u^* on figure 1.

Having noted this last point, however, it does seem to this author that, in the current era in the United States, government agencies at all levels are under pressure to avoid budget deficits that might require tax increases (and hence US Government agencies, except those whose mission has to do with security, are all under pressure not to do anything that increases public expenditure). Also, in the United States at least, momentum within government is toward deregulation rather than additional regulation of economic activity. Given this, it seems plausible that fiscal illusion that impedes governments from making expenditures that are socially desirable is more likely than fiscal illusion that leads to overregulation. If this is indeed so, the case for granting property rights for public goods to the public rather than to suppliers, and hence not requiring public compensation to suppliers for regulatory actions affecting public goods, would seem more compelling than the case for granting these rights to the suppliers.

4. CONSIDERATIONS OF MORAL HAZARD

"Moral hazard" has become a term with differing usage, even within economics. Originally the term was associated with hidden (and often illegal) contracts that could have adverse economic effects. The classical example is of the owner of a building who insures it for greater than market value and then hires an arsonist to set it on fire to collect on the insurance. (The hiring of the arsonist is the "hidden contract",

and the adverse outcome is of course the loss of the building combined with the overpayment to the owner.) In contemporary times, the term moral hazard is also used to depict a situation where a government (or supranational agency such as the International Monetary Fund) commits to cover a potential loss, where that commitment conveys some element of subsidy[16], and this leads to an adverse outcome, e.g., a taking of an otherwise unacceptable risk by the insured party knowing that, if the outcome is unfavorable, the loss will be covered.

To introduce a consideration of moral hazard into a discussion of treatment of takings, suppose that the property right to a public good is granted to a firm that is about to commence making a product under the following circumstances: (1) the firm must decide how much to invest in capacity for this product; (2) the manufacture of the product requires use of the public good which, for the moment is unrestricted; however, there is some chance that for public health reasons, this use will in the future be restricted. Under these circumstances, the property right can be claimed to create moral hazard in the following sense: the firm will invest in more capacity than it would if there were to be no compensation for the taking of this right by the government.

To illustrate this via a simple example, suppose the cost of the capacity is given by T(q), where q is the output when the capacity is fully utilized. Let us further assume what in the industrial economics literature is called a "two-period" model, where in the first period capacity is set and then in the second period the product is produced and sold; there are no subsequent periods. In the second period, the firm sells to a market where total demand is given by D(q) at a price P(q), such that D(q) is simply equal to q (i.e., the firm is able to sell all of its output) but where P(q) diminishes with increasing q (i.e., the firm is not a price taker but, rather, has market power). Finally, we assume that the only cost incurred by the firm is that of creation of capacity T(q), where this cost is linear, i.e., there are constant returns to scale.

Absent the risk that the product will be subject to some form of regulation, the firm then maximizes profits $p = p(q) \cdot q - T(q)$ when the first derivative of π with respect to q is set to zero, or

$$\frac{dp}{dq} = q\frac{dp(q)}{dq} + p(q) - \frac{dT(q)}{dq} = 0$$

implying of course that $\frac{dT(q)}{dq} = q\frac{dp(q)}{dq} + p(q)$, which simply is the standard condition that marginal revenue must be equal to marginal cost (but, in this case, the marginal cost of additional capacity) in order for profits to be maximized. The solution of this equation yields the capacity that would be installed by

[16] Including government-provided insurance where the price of the insurance is below what the market would charge in like circumstances.

the firm in order to maximize profits. Given the assumption of constant returns to scale, this last equation can be restated as $C = q \cdot \frac{dp}{dq} + p$, where C is the unit cost of capacity and the explicit dependence of p on q is dropped.

But, would the firm install the same capacity if there were some chance that, for reasons of health, the output would be regulated in the future? The answer is no: suppose that, if it is determined that the output of the product produced a health risk, this output were to be banned, and that the firm assesses the probability of this happening to be ϕ. (We assume that the regulation is an outright ban.) Given this, the probability is $(1-\phi)$ that the firm can produce the product but, with probability p, the firm will lose entirely any investment it had made in capacity to produce the product. If the firm has risk-neutral preferences, it is willing to make decisions based on expected value of outcomes. In this case, the expected profit is given by the following

$$p = (1-f)\cdot(pq - T) - f \cdot T = (1-f)\cdot pq - T .$$

In other words, the expected revenue falls from $p \cdot q$ to $(1-\phi)\cdot p \cdot q$, where the latter is less than the former because $0 < \phi < 1$. But the expected costs at any given level of output remain the same (these are incurred whether or not the production of the product is banned). Given that expected revenue at any level of output is now less than before, the expected marginal revenue at any level of output is also less than before. Given that the marginal cost of additional output is constant, to achieve equality of marginal cost to marginal revenue, the firm would now reduce capacity from that which maximizes profits where there is no chance of regulation being imposed. Furthermore, this is a socially optimal decision.

But what if the firm could expect compensation for any expenditure on capacity if the product were to be regulated (in our example, banned)? In this instance, there would be no net cost to the firm if the product were banned. The expected profit would then be

$p = (1-f)\cdot(pq - T) - f \cdot 0 = (1-f)\cdot pq - (1-f)T)$; in effect, expected marginal cost would be reduced from T to $(1-\phi)\cdot T$, and the firm would expand capacity over that which it would have set had there been no requirement for compensation.

This is a nonoptimal result because the government is in effect subsidizing the firm to take more risk than it should from the point of view of social optimality. The subsidy arises because the government in effect indemnifies the firm against the costs of future regulation implemented for environmental reasons, and hence relieves the firm of having to take into account the risk of such regulation in making current investment decisions. Were property rights to environmental goods to be assigned to the public rather than the polluter, this subsidy element would not exist and, hence, this would be another reason

why public holding of the property right might yield a better outcome than assignment of the property right to the polluter.

5. CONCLUSIONS

From the point of view of economics, the issue of what to do to reduce the stress on the environment created by economic activity largely boils down to how to deal with external costs, i.e., ones that are borne by society at large rather than by those economic agents involved in the transactions that give rise to these costs. The further issue is how to correct for the market failure that is created by these costs. Coase's theorem is very often invoked in this latter matter: the essence is that the market failure can be corrected by assigning a property right to the underlying public good either to the user of this good (the "polluter" in the case where the public good is the air) or the public at large, such that a market can then operate whereby the polluter can buy rights for use of the public good or the public can buy rights for non-use of it, depending upon who holds the rights initially. The two different assignments have differing implications for who bears the cost of the action necessary to achieve the optimal outcome; but this is a matter of social choice and does not affect an efficient solution of the market failure.

Under this reasoning, if NAFTA tribunals in dispute settlement cases, where the dispute is over the diminishment of value of an investment resulting from imposition of a governmental regulation, side with plaintiffs, the effect is essentially equivalent to the assigning of a property right to a public good to the investor.[17] Coasian reasoning suggests that this could lead to an optimal outcome. However, issues of fiscal illusion and moral hazard do call into question whether this assigning of a property right to the user of the public good is as likely to lead to a desirable outcome as Coase's reasoning would suggest. To be sure, the risk also looms, albeit in this author's judgment a lower risk, that fiscal illusion could also negatively affect the outcome of assigning a property right to the public good to the general public. However, the same does not seem to be true for moral hazard; if moral hazard is a factor, it only negatively affects the outcome if a property right to a public good is assigned to the user, and not if this right is assigned to the public (The author did try to think of an instance where assignment of the right to the public would create a problem associated with moral hazard, but came up empty-handed). On balance, if either fiscal illusion or moral hazard exerts itself, this balance is tilted towards assigning property rights to the public and not to the user of the public good, in the sense that the former assignment seems likely to result in a more desirable outcome than the latter.

[17] If the outcome of NAFTA Chapter 11 dispute settlement decisions were to be a dual system, whereby property rights to public goods are assigned to investors if these investors are foreign but to the public if the investors are domestic, this duality might in itself create some problems with respect to efficient solution of market failure created by external costs. This possibility is not explored here.

It must be stressed that this result is independent of the issue of who pays to achieve a socially desired environmental goal, an issue that is, as stressed before, one of public choice. The argument here for assignment of the property right is, in other words, based on considerations of efficiency, not equity. But, if indeed considerations of equity are considered as valid, and if society deems that it is in fact more equitable that "the polluter pays" than that "the public pays," then the result here is aligned properly with this choice.[18]

[18] Again, it must be stressed that this does not imply that governments would not have to compensate investors for expropriations or measures that truly were tantamount to expropriations. See footnote 3 on p. 3.

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