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Regulatory Review of Environmental Policy: The Potential Role of Health-Health Analysis

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Abstract

Health-health analysis (HHA) posits a seemingly unassailable criterion for regulatory assessment: policies intended to protect human health ought to exhibit positive health benefits. Despite the apparent logic of this criterion, it is important to ask whether it would aid in the quest for better public policies. In the context of environmental issues, we find that HHA can be useful by reminding us that it is the *net* health impact of a proposed regulation that can be important. However, we also find that in most applications the health impacts of regulatory compliance costs are unlikely to be significant. Conventional benefit-cost analysis ought to remain the principal tool of economic assessment of environmental laws and regulations.

Key words: health-health analysis, regulatory review, environmental policy

Public demand for environmental quality may be greater than ever before, but the incremental costs of environmental protection have also reached unprecedented levels.[1] Because of this, it is increasingly important that both government and private actions be focused on those problems where efforts are likely to achieve their greatest impacts. But, arguably, government priorities (and hence private actions) are seriously out of alignment with scientific estimates of relative risk,[2] let alone economic rankings of most pressing problem areas. As a consequence, there is now relatively broad recognition that greater attention to the benefits and costs of environmental policies and programs is merited.[3]

Economists, of course, have long argued that economic efficiency—maximizing the difference between benefits and costs—ought to be one of the fundamental criteria for environmental (and other) policy evaluation. Consequently, they have recommended that benefit-cost analysis (BCA) be used in the assessment of proposed laws and regulations. Although there has been a measure of support for this view from the policy

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community,[4] there has also been substantial opposition, reflecting—in part—widespread skepticism regarding the accuracy of economic methods of valuing the benefits of environmental protection and regarding the overall usefulness of economic efficiency criteria for setting social welfare standards.[5] Partly in response to this mistrust of economic efficiency as a decision criterion, and of benefit-cost analysis as an evaluation method, increasing attention has been given over time to the more modest analytical device of cost-effectiveness analysis (CEA)—seeking to adopt the least-cost method of achieving a given environmental protection goal.[6]

Cost-effectiveness analysis, of course, is incapable of aiding in the search for economically efficient goals or standards. Moreover, the very notion of considering compliance costs is problematic in the context of a number of existing federal policies and programs. Indeed, a number of major environmental statutes explicitly prohibit the consideration of costs when setting standards.[7] This situation combined with the difficulty of valuing many benefits in *economic terms*, has led to attention being given to some newer (and more narrowly defined) evaluation criteria, including: risk-risk analysis (RRA)—comparing the health risk associated with some product (or process) with the health risk associated with a substitute product (or process) or with the health risk associated with control (risk-reduction) technologies;[8] risk-benefit analysis (RBA)—in which the environmental risk associated with a product is weighed against the economic benefits it generates; and, most recently, health-health analysis (HHA).[9] This last approach posits a modest and seemingly unassailable criterion for policy evaluation: policies that are intended to protect human health ought to exhibit positive health benefits.

Despite the simplicity and apparent logic of the HHA criterion, it is useful to scrutinize it more closely to see whether it would really aid in the quest for better public policies. The purpose of this article is to address this question, principally in the context of environmental risk reduction. In the next part of the article, we place HHA in an analytical context that allows us to view it alongside related criteria such as BCA and CEA. We then use this framework to examine several practical issues associated with applying HHA methods to real-world environmental problems; the final part of the article provides a brief description of policy implications.

1. An economic context for health-health analysis

Within the realm of environmental policy, economic (Pareto) efficiency requires that the degree of environmental protection (or more specifically, the level of pollution control) be such that the *net* benefits of control are maximized. Since a necessary condition for this goal to be achieved is that the marginal benefits of pollution control be equated across sources with the marginal costs of control, a potential Pareto-improving policy change[10] is one for which the marginal benefits of the change exceed its marginal costs. In other words, we can ensure that we are moving toward the optimal level of aggregate pollution control by insisting that the incremental benefits of the policy change exceed its incremental costs. This is the economic justification for the use of benefit-cost analysis (BCA) as an evaluation criterion.

To make the BCA criterion operational, it is necessary that all benefits and costs be valued in some common terms, typically economic ones; i.e., it is necessary to "monetize" all benefits and costs. Concerns among non-economists about conceptual difficulties and concerns among economists about empirical difficulties of quantifying environmental benefits in economic terms have led to some use of a cost-effectiveness criterion, the purpose of which is simply to minimize the aggregate costs of pollution control.

Because of statutory constrains limiting the use of cost information in setting standards and because of the recognized difficulty of monetizing all benefits, there has been interest in developing an evaluation criterion that focuses exclusively on benefits, and measures benefits in some physical rather than monetary unit.[11] Within a limited domain, health-health analysis (HHA) potentially satisfies this interest by positing that policies intended to protect human health ought to exhibit positive health benefits. Let:

$$B_i(q_i) = \sum_{h=1}^{H} B_{hi}(q_i) + \sum_{\bar{h}=1}^{\bar{H}} B_{\bar{h}i}(q_i), \tag{1}$$

where q_i is the level of pollution control adopted by source i, $B_i(q_i)$ is the total benefit of pollution control by source i,[12] B_{hi} are the health benefits of a policy associated with source i, and $B_{\bar{h}i}$ are the non-health benefits associated with source i. For example, B_{hi} might be lives saved as a result of pollution control, while $B_{\bar{h}i}$ could take the form of improved aesthetics or protection of ecosystems. Then, we might require that:

$$\sum_{h=1}^{H} \sum_{i=1}^{N} B'_{hi}(q_i) > 0. \tag{2}$$

where N is the number of sources, and $B'_{hi}(q_i)$ refers to the marginal benefits of pollution control.

The heart of the HHA approach goes beyond this, however. It posits that the health benefits of a risk-reducing policy, B_{hi}, are themselves partly a function of the costs of compliance with the policy, since economic costs of a program may lead indirectly to increases in morbidity or even mortality by reducing disposable income and wealth and thereby reducing the resources available to individuals and families for expenditures related to their health.[13] In order to understand the HHA approach, we must rewrite the benefit function as:

$$B_{hi} = B_{hi}(q_i, C(Q)), \tag{3}$$

where we know that

$$C(Q) = \sum_{i=1}^{N} C_i(q_i), \tag{4}$$

and $C_i(q_i)$ is the total cost of pollution control by source i. It is assumed that:

$$\frac{\partial B_{hi}}{\partial C} \leq 0 \; and \; \frac{\partial C_i}{\partial q_i} \geq 0. \tag{5}$$

Thus, we find that the marginal health benefits of an environmental policy may be positive, negative, or zero, since:

$$\frac{dB_{hi}}{dq_i} = \frac{\partial B_{hi}}{\partial q_i} + \frac{\partial B_{hi}}{\partial C} \cdot \frac{\partial C}{\partial Q}. \tag{6}$$

The first term on the right-hand side of equation (6) represents the direct health impact of an increase in environmental protection, and is presumably positive; the second term is the indirect health effect of the costs of environmental protection, and *may* be negative; and the third term is the impact of increasing levels of environmental protection on aggregate control costs, and is inevitably positive. Thus, the indirect health effects of a policy change *may* overwhelm the direct effects, depending on the magnitude of each.

In this way, health-health analysis attempts to provide a new criterion for regulations aimed at protecting public health, namely that:

$$\sum_{i=1}^{N} \sum_{h=1}^{H} \left[\frac{dB_{hi}}{dq_i} \right] > 0. \tag{7}$$

The initial question we need to address is whether this is useful either as a necessary or a sufficient condition for public policy.

2. Assessing the value of health-health analysis

We now examine HHA's potential usefulness within the context of conventional welfare economics, recognizing the desirability of policies that represent potential Pareto improvements, as defined above.[15] First of all, it is easy to dispense with any thoughts of employing HHA as a *sufficient* condition for changes in environmental policies, because, even if a regulation passes the test of equation (7), the marginal costs of the policy change may overwhelm the sum of all marginal benefits (including the health benefits).

This leads to the question of whether HHA can be considered as an appropriate *necessary* condition for environmental policies. Presumably this is closer to what the proponents of HHA have in mind: if a (health-related) regulation fails to exhibit positive net health benefits (i.e., if the condition expressed by equation (7) is not met), then the regulation should not be adopted. This apparently reasonable condition will not necessarily lead to better environmental policy.

2.1. The Congressional Record and implicit use of HHA/RRA

In a very general sense, HHA has already been used implicitly by the U.S. Congress when it has contrasted the health consequences of regulating some substance with the health consequences of not regulating that substance. Saccharin remains on the market as an artificial sweetener, even though some rodent bioassays have suggested it is a mild carcinogen. This is because Congress decided that saccharin's beneficial effects in combatting obesity outweighed the risks it posed, the Delaney clause not withstanding.[16]

Similarly, nitrates continues to be used as preservatives in bacon and other cured meats, because their value as a preservative to combat botulism outweighs the carcinogenic risk they pose when heated and converted to nitrosamines.

These are situations in which the first term on the right-hand side of equation (6), $\partial B_{hi}/\partial q_i$, is negative for some values of h and positive for others. However, in the aggregate

$$\sum_{i=1}^{N}\sum_{h=1}^{H}\left[\frac{\partial B_{hi}}{\partial q_i}\right] < 0, \tag{8}$$

and therefore (since the second term in equation (6) is assumed to be non-positive), the condition in equation (7) is not satisfied. This type of situation appears to be closer to Lave's Risk-Risk Analysis (RRA) than to what the proponents of HHA really have in mind. Furthermore, the saachrin and nitrates cases are relatively easy, because the health risks that could arise as a result of regulation derive from the very absence of the regulated substances themselves. Hence, the risks from taking regulation action can be compared relatively easily with the risks of *not* regulating.

In its current and more controversial application, however, HHA poses a more difficult question: can the *economic burden* associated with a proposed regulation so adversely affect some individuals or families that the health losses they suffer as a consequence actually offset the improvements in health enjoyed by the beneficiaries of the regulation? It is to this question that we now turn.

2.2. HHA when costs of compliance increase unemployment

Conceptually, the answer to the above question *could* be yes. Consider an extreme example. Suppose that the Occupational Safety and Health Administration (OSHA) issued a stringent and costly rule to protect workers' exposures to a known airborne carcinogen found in the workplace of a particular industry. Suppose also that this industry faces severe foreign competition, so that it is difficult to pass the higher costs on to customers. Suppose further that some of the firms in this industry were only marginally profitable prior to the regulation. Faced with the costly new regulation, some firms might close their plants. If workers who lost their jobs could not find other employment, the adverse effects on their health and their families' health could more than offset the potentially beneficial effects of controlling exposures to the regulated airborne carcinogen.

Thus, $\partial B_{hi}/\partial C$ in equation (6) could be sufficiently negative in enough cases that the double summation condition in equation (7) would not be satisfied. The reason why this possibility seems plausible is that we have assumed that the regulation causes unemployment or drastic decreases in real wages of affected parties. If HHA were to be restricted to this type of situation, where the costs of regulation are manifested in the form of unemployment or concentrated wage impacts, the approach would probably be less controversial than it has been to date.

2.3. HHA when costs of compliance increase product prices

Proponents of HHA have argued for much broader applications. To continue with the previous example, suppose that competitive conditions in the industry are such that firms are able to pass on to customers much of the added costs of controlling the regulated airborne carcinogen. Regardless of whether consumers purchase the industry's product directly or pay more for final products from other industries (as a result of intermediate production processes), consumers' real disposable incomes will fall when prices rise. Is it possible that this fall in consumers' real incomes could have sufficiently adverse effects on their health that the direct health protection enjoyed by workers in the regulated industry would, in the aggregate, be more than offset?

The question again is whether $\partial B_{hi}/\partial C$ in equation (6) could be sufficiently negative in enough cases that the condition in equation (7) would not be satisfied. In the broadest theoretical sense, the answer can only be that such a set of relationships is *possible*. But it is important to distinguish between situations in which regulatory compliance costs are manifested in the form of unemployment and situations in which costs result in higher product prices. The fact is that we should be much more skeptical in the latter case about the likelihood of such results occurring, despite existing cross-sectional analyses of a correlation between income and health.[17]

The problem is that the theoretical relationship between income and health at the individual level is one which is most compelling for large changes in income, or, in the extreme, in the case of induced unemployment. In other words, the relationship between income and health at the individual level is highly nonlinear; indeed, it likely exhibits a threshold effect in which the marginal health loss becomes great only at very high income losses (or, in the limit, unemployment). Having said this, there is reason to doubt that slight real income losses, even if spread broadly across the population in the form of increased product prices, would translate into significant aggregate health impacts. If $\partial B_{hi}/\partial C$ in equation (6) is extremely small, as it would be in the case of product-price effects, then, even if the number of persons over whom these impacts are aggregated is great, it is unlikely that the condition in equation (7) will fail to be satisfied *as a consequence*.[18]

2.4. HHA in the presence of heterogeneous health benefits

In applications to date, HHA has focused attention in regulatory review on the number of lives that are saved (or lost) as a result of a regulation. Since regulations generally produce other health benefits besides life saving, it is as myopic to focus on life saving alone as it is to evaluate proposed regulations on the basis of the jobs that they create or destroy. Although it may be essential in evaluating proposed rules to know what effect they will have on both jobs and lives saved, analysts obviously need other information as well. Unless these other benefits and costs can be expressed easily in terms of lives saved, it is not clear how much better off we will be using HHA as compared, say, to conventional benefit-cost analysis.

Consider the following example. More stringent controls on fine particulate emissions from stationary sources will reduce ambient concentrations of these particles. According to a number of epidemiological studies, this, in turn, will effect reductions in premature mortality;[19] these would be the direct health benefits associated with particulate control. Using HHA, one would presumably translate the cost of controlling particulates into increased mortality using techniques discussed by Lutter and Morrall (1992), among others. But what about the *reductions* in *morbidity* that would follow from reduced particulate concentrations? How many fewer non-fatal illnesses add up to one less death?[20] In other words, even if dB_{hi}/dq_i is negative for some health impacts (mortality), the sum in equation (7) may be positive because of other health impacts.[21]

2.5. *HHA in the presence of non-health regulatory benefits*

Another potentially important limitation of HHA in the environmental-policy context arises because of the variety of benefits that are associated with many regulations. Although health criteria are a central part of the Clean Air Act[22] and some other major environmental statutes, many environmental laws and regulations that are intended mainly to protect human health have significant non-health benefits as well. Fine particulate emissions that pose a risk of premature mortality also impair visibility and can damage exposed materials. Regulations that protect forested wetlands may have their primary impacts in terms of water-quality (and hence human-health) benefits, but these same policies also protect wildlife habitat, and for that matter, may retard carbon dioxide build-up in the atmosphere. In the context of the framework we developed above, the problem is that even if the condition described by equation (7) is not fulfilled (i.e. the sum of health benefits is negative), the sum of all health and non-health benefits[23] could well be positive; and, moreover, marginal *net* benefits could be positive as well.

2.6. *Asymmetrical applications of HHA*

If the job losses and reduced incomes that can result from regulation are to be translated into lives lost, so, too, should the higher incomes and new jobs resulting from regulation be converted into life-saving benefits. Thus, if Superfund cleanups employ previously unemployed workers, or if air pollution regulations increase the incomes of those producing control equipment, their economic fortunes will improve and—according to HHA assumptions—so will their life expectancies. The latter should be added to the direct life-saving benefits associated with the rule in question before final calculation can be made of the net effect of the regulation on lives saved or lost.

This is a difficult point to grasp, especially for economists trained to think of employment in the pollution-control industry as a cost for someone (which it is), without also viewing it as a benefit to those who hold jobs, or reap the return to invested capital in the industry (which it also is). Nevertheless, if HHA is to be properly applied, proponents must recognize that there are two kinds of life-saving benefits that can result from regulation. Thus, if the relationship posited by equation (3) is valid, it is certainly possible that for some people $\partial B_{bi}/\partial C$ may actually be positive, and hence the potential trade-off represented by equation (6) may not be a trade-off at all.

3. Implications for public policy

Rising demand for environmental protection coupled with sharply increasing costs for compliance are likely to lead to greater attention being given to the benefits and costs of environmental policies and programs. Economists have long argued that the use of an economic-efficiency criterion and its operational sibling, benefit-cost analysis, would be most appropriate for evaluating public policies, but because of statutory constraints limiting the use of cost information in setting standards and because of the recognized difficulty of monetizing all benefits, there has been interest in developing an evaluation criterion that focuses exclusively on benefits, and measures benefits in some physical rather than monetary unit. Within a limited domain, health-health analysis (HHA) potentially satisfies this interest by positing that policies intended to protect human health ought to exhibit positive health benefits.

Clearly, it makes little sense to employ HHA as a sufficient condition for changes in environmental policies, since the marginal costs of a policy change may overwhelm the sum of all marginal benefits (including health benefits). One can also consider the possibility of using HHA as a necessary condition for policy assessment. In particular, could the economic burden associated with a proposed regulation so adversely affect some individuals or families that the health losses they might suffer as a consequence could actually offset the improvements in health enjoyed by the beneficiaries of the regulation?

Conceptually, of course, the answer to this question could be yes, particularly in situations where the costs of compliance with a regulation lead to increased unemployment or significant wage decreases. For this reason, we believe that there is real value in thinking through—as HHA can make us do—the *net* effects on human health of ostensibly protective health-based regulations. In this sense, then, proposals regarding HHA have stimulated worthwhile debate.

The proponents of HHA, however, have argued for much broader applications. Is it possible, they ask, that the induced fall in consumers' real incomes due to higher product prices could have sufficiently adverse effects on their health that the direct health protection enjoyed by workers in the regulated industry would, in the aggregate, be more than offset? In the broadest theoretical sense, the answer can only be that such a set of relationships is possible. In a practical sense, however, this seems to us to be an unlikely outcome. This is because the relationship between income and health at the individual level is highly nonlinear. Hence, slight real income losses are not likely to translate into aggregate health impacts of significance.

Another limitation of HHA is linked with the heterogeneous nature of health benefits. Since regulations generally produce other health benefits besides life saving, it is as myopic to focus on life saving alone as it is to evaluate proposed regulations exclusively on the basis of the jobs that they create or destroy. What about reductions in morbidity that may accompany a positive or negative net change in mortality due to some regulation? In a similar fashion, the non-health regulatory benefits of environmental policies present some real problems. Many environmental laws and regulations that are intended mainly to protect human health have significant non-health benefits as well. Why should these be systematically ignored? Finally, there is the problem of asymmetrical applications of HHA. If the job losses and reduced real incomes that can result from regulation are to be translated into lives lost, so, too, should the higher incomes and jobs created by regulation be converted into life saving benefits.

In summary, we find that HHA can be expressed in an analytically consistent framework, along with BCA and CEA, and that HHA *does* have a potentially useful role to play in reminding us that it is the *net* health impacts of a proposed law or regulation which can be important, not simply the gross health impacts. In practical applications, however, it is unlikely that the health impacts of regulatory compliance costs would be significant, except in those situations in which substantial unemployment is induced. Furthermore, when evaluating a proposed regulatory change, it is important to consider the regulation's non-life-saving health benefits, its non-health environmental benefits, and its possible positive health impacts due to compliance costs. All of this suggests to us that conventional benefit-cost analysis ought to remain the principal tool of economic assessment of environmental laws and regulations. Additional efforts should be dedicated to developing better etimates of benefits and costs, rather than to developing an equally controversial and admittedly partial criterion.

Notes

1. The U.S. spends a greater share of its gross national product in complying with environmental laws and regulations than any other nation in the world. Currently, annual expenditures for compliance with Federal environmental regulations exceed $130 billion. This estimate excludes environmental activities not directly associated with pollution control or cleanup, such as wildlife conservation and land management. See U.S. Environmental Protection Agency (1990).
2. See U.S. Environmental Protection Agency (1987); U.S. Environmental Protection Agency, Science Advisory Board (1990); and U.S. General Accounting Office (1991).
3. See, for example, Schneider (1993).
4. For example, President Reagan's Executive Order 12291, issued on February 17, 1991, stated that economic efficiency should be the basis for evaluating new major regulations, and that all new major regulations must be subjected to a benefit-cost analysis before any action on them could be taken. See Smith (1984). In addition, both the Toxic Substances Control Act and the Federal Insecticide, Fungicide, and Rodenticide Act require the Administrator of the U.S. Environmental Protection Agency (EPA) to balance (qualitatively) the benefits and costs of proposed regulations.
5. The environmental advocacy community, an important set of players in U.S. environmental policy deliberations, has consistently opposed attempts to value the benefits of environmental protection in economic terms and to compare such benefits to the costs of environmental protection efforts. For some recent examples of this perspective, see Schneider (1993).
6. Cost-effectiveness analysis is a component of benefit-cost analysis.
7. Five major statutes virtually prohibit the Administrator of the U.S. Environmental Protection Agency from considering costs in setting health-based or other standards: the Clean Air Act; the Clean Water Act; the

Resource Conservation and Recovery Act; the Safe Drinking Water Act; and the Comprehensive Environmental Response, Compensation and Liability Act (the "Superfund" law).

8. See Lave (1981); and Huber (1983).
9. It appears that the first attempt to use this approach was by the U.S. Office of Management and Budget as part of its review of an Occupational Safety and Health Administration (OSHA) proposal to reduce exposure to workers in certain industries to air contaminants. See MacRae (1992). For a recent explication of the approach, see Lutter and Morrall (1992).
10. A *potential* Pareto improvement (policy change) is one for which the winners from the policy change could—in theory—compensate the losers from the policy change to such a degree that no one would be worse off and at least one individual would be better off.
11. We should recognize that focusing exclusively on benefits, even benefits measured in physical, not financial, terms does not avoid two of the primary concerns many policy makers have about benefit-cost analysis: difficulties associated with intertemporal analyses (i.e., discounting); and the fact that distributional considerations are ignored. For example, see Cropper, Aydede, and Portney (1992) for a discussion about discounting lives saved when carrying out intertemporal cost-effectiveness analysis.
12. We define the total benefits of pollution control in the usual way to be the aggregate of the difference between each person's willingness-to-pay and the price (if any) he or she actually faces, i.e., consumers' surplus.
13. One of the first to identify this linkage theoretically was Wildavsky (1980). The first analysis that sought to measure this potential linkage empirically was Keeney (1990). For a review of the empirical literature, see Lutter and Morrall (1992). There are a number of potentially important problems associated with many, if not all, of these empirical studies, including: problems of drawing dynamic inferences from cross-sectional analyses; potential simultaneity bias (correlation versus causation); possible excluded variable basis; and confusion between transitory and permanent income effects. On this last issue, see Graham, Chang, and Evans (1992); and Sinsheimer (1991).
14. We later relax the assumption expressed in the first inequality of equation (5) to allow for situations in which some compliance costs may result in health improvements for some sectors of the population.
15. Note, however, that health—unlike money—may be non-redistributable.
16. The 1958 amendments to the Federal Food, Drug, and Cosmetic Act of 1938 include the so-called Delaney Clause, which requires that food additives be considered unsafe if they are found to induce cancer in humans or animals (regardless of the dosage).
17. See Keeney (1990); and Chapman and Hariharan (1993).
18. It should also be recognized that significant changes in income at the macro (national) level can affect environmental quality, either because of the positive income elasticity of demand for environmental amenities or because of the abilities of wealthier societies to pay for environmental protection. For some environmental problems, such as inadequate sanitation and unsafe drinking water, there tends to be a monotonic and *inverse* relationship between the level of the environmental threat and per capita income, with this relationship holding both cross-sectionally (across nations) and for single nations over time (International Bank for Reconstruction and Development, 1992). For other environmental problems, the relationship with income level is not monotonic at all, but a "hill" in which, at low levels of income, pollution increases with per capita income, but then at some point begins to decline with further increases in income. This is true of most forms of air (Grossman and Krueger, 1991) and water pollution, some types of deforestation, and habitat loss. Finally, for another set of environmental pollutants, including carbon dioxide emissions, there is an *increasing* monotonic relationship between per capita income and emission levels, at least within the realm of experience. Hence, the "aggregate income/environmental control effect" can operate either in the same direction as the income-health effect considered in HHA or in the opposite direction, depending upon the specific environmental problem of concern and depending upon the specific nation under consideration. As this note illustrates, there are numerous ways in which the simplest regulatory analysis could (theoretically) be made more comprehensive so that it would approach a true general equilibrium method.
19. See, for example Schwartz and Dockerey (1992).

20. There is a growing body of literature that attempts to translate morbidities into fatality equivalents. See Zeckhauser and Shepard (1976); and Johannesson, Pliskin, and Weinstein (1993).
21. This is complicated further by the fact that there is some evidence of income-health correlations for morbidity, as well as mortality. See, for example House, Kessler, Herzog, et al. (1990).
22. The Clean Air Act may provide an extreme example, since it has been estimated, for example, that health effects accounted for nearly 78 percent of the total benefits of air quality improvements over the period 1970 to 1978. See Freeman (1982).
23. See equation (1), above.

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