THE HAMILTON PROJECT

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A Better Approach to Environmental Regulation: Getting the Costs and Benefits Right

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MISSION STATEMENT

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NOTE: This discussion paper is a proposal from the author. As emphasized in The Hamilton Project's original strategy paper, the Project was designed in part to provide a forum for leading thinkers across the nation to put forward innovative and potentially important economic policy ideas that share the Project's broad goals of promoting economic growth, broad-based participation in growth, and economic security. The authors are invited to express their own ideas in discussion papers, whether or not the Project's staff or advisory council agrees with the specific proposals. This discussion paper is offered in that spirit.

BROOKINGS

Abstract

Cost-benefit analysis of environmental regulation plays a key role in determining how to achieve our environmental goals without imposing unnecessary costs on the economy. This paper proposes three reforms that address several problems that undermine the role played by cost-benefit analysis in environmental regulation. First, agencies should be required to use a checklist of good empirical practices and should promote decentralized evaluations of data and research. Second, absent compelling systematic evidence to the contrary, agencies should presume that consumers are best able to make their own energy-saving decisions, and should focus on regulations that address the harm that people impose on others. Third, a six-month early regulatory review process should be established for particularly important regulations to allow sufficient time for a thorough cost-benefit analysis and the incorporation of the results into the final regulations.

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Chapter 1: Introduction

Environmental policy often addresses situations in which the private decision of a firm or a consumer has negative consequences for others. For example, a coal-fired power plant may produce air pollution that leads to costly respiratory disease in downwind cities. Neither the power plant nor the households that buy power from the plant have much incentive to prevent or mitigate the pollution. The broader community, however, suffers, and the health costs may exceed the cost savings of using coal instead of other energy sources that have fewer detrimental health and environmental impacts. In short, the private market has created a situation where government intervention can improve our well-being through policies that reduce the amount of pollution.

Whether the health and environmental benefits of regulations are worth their economic costs is an ongoing public debate. This debate is of particular interest today because of the recent Supreme Court decision that led to the regulation of greenhouse gases under the Clean Air Act by the Environmental Protection Agency (EPA). Given the widespread nature of such emissions in a modern economy that relies heavily on energy generation, this approach will entail significant economic costs. Cost-benefit analysis (CBA) is at the heart of all such debates about regulation and is particularly relevant today. For regulations to be beneficial, their benefits in terms of pollution reductions must exceed the costs to the firms (and others) of complying with them. The best regulation is one that maximizes the difference between these benefits and costs.[1]

Although the conceptual argument for using CBA within the regulatory process is very strong, there are three substantial problems with how it is currently used in practice: the credibility of the empirical studies used in CBAs, the growing use of the assumption that people may not always make decisions in their own self-interest, and the time allowed for review of CBAs within the regulatory process.

First, there are problems with the empirical credibility of many CBAs, stemming from the use of studies that do not establish credible causal relationships between the action, such as the environmental emission, and the consequence, such as the diminution in health. Not all data and analyses are of equal quality. Nonetheless, by and large regulators take empirical studies as inputs without assessing the quality of the research designs used to examine the causal relationship. Relying on flawed empirical studies can result in regulations that either fail to adequately protect the health and welfare of Americans or are too costly. In either case, resulting regulations do not maximize our well-being.

Second, there is an increasingly important methodological challenge to CBA concerning the treatment of private benefits to individuals from energy-saving regulations. The traditional approach to CBA assumes that informed citizens are best able to understand and then choose among the available options for the one that best meets their own interests. An individual planning to buy a car, for example, would understand that a large sedan has worse gas mileage than a compact car and

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would incorporate into her purchase decision the higher expense of gas over the period she expects to own the car. These expected fuel costs would be considered along with all of the car's other characteristics, including trunk size, comfort, and so on, to make a decision. Thus, assuming no market barriers that interfere with consumer behavior, regulations that alter consumer's choices are assumed not to have any private net benefits. A regulation that requires consumers to buy a more expensive, more energy-efficient product, for example, may produce social benefits from reduced pollution, but it cannot be assumed to make the consumer herself better off; if the product were indeed better, the consumer would have bought it in the first place.

The growing field of behavioral economics, however, has questioned the appropriateness of assuming individual rationality. With respect to energy efficiency, irrational behavior may result in people failing to purchase energy-saving products that reduce their private net costs of energy use. This can result from a failure to take into account and process all the information available, or a failure to value the future relative to current costs.

In a departure from the traditional approach to CBA, recent regulatory analyses have incorporated private benefits under the implicit assumption that consumers have made suboptimal purchasing decisions. In effect, these analyses assume regulations have benefits to consumers because they mandate them to buy products that the government believes make them better off. For example, regulations that raise the cost but improve the mileage of a large sedan are assumed to benefit drivers by saving them money in the future (even when cars that are more fuel-efficient are already available in the marketplace). Recently proposed regulations of energy-efficiency standards have relied on this assumption to estimate substantial private net benefits. For example, 88 percent of the gross benefits of new fuel economy rules issued by the EPA and the Department of Transportation (DOT) arise from private savings to consumers in the form of fuel savings, benefits of increased driving, and reduced refueling time (DOT 2009). Absent the assumption that consumers are behaving irrationally, these regulations might not pass a cost-benefit test: they might be imposing costs on consumers and businesses in excess of the benefits from reduced environmental damage. This is an especially pressing issue because there has been a move toward regulating greenhouse gases through energy-efficiency standards.

Finally, the regulatory oversight process needs to be improved in order to elevate CBA as a component of regulatory policy, making it more central to decision-making. Under the current system, the Office of Management and Budget (OMB) oversees the regulatory process. But the OMB review tends to come after the agencies have largely developed their proposed or final rules. Agencies conduct regulatory impact analyses (RIAs), which include CBAs, in advance of formally proposing or finalizing a regulation. But draft RIAs are not circulated to top decision-makers until about three weeks in advance of final agency review, or even later. This leaves little time for the RIAs to be used as inputs into decision-making; instead, they are frequently used to justify decisions that have already been made. Furthermore, the current process is not well equipped to adjust to new information about existing regulations. The regulatory process needs a systematic approach to reevaluate, and—where needed—to change existing regulations as new information on costs and benefits is acquired.

Given the central role that CBA does (and should) play within our regulatory process, we need to improve its use in practice by placing more scrutiny on the quality of the empirical analyses, by addressing methodological challenges that pose a threat to its usefulness, and by improving the oversight process. I propose three changes to the regulatory review process:

- **Proposal A:** Require the use of a checklist of good empirical practices and promote decentralized evaluations of data and research. Both these steps will provide information for subsequent retrospective analyses.
- **Proposal B:** Exclude private net benefits from CBAs for energy-efficiency standards.
- **Proposal C:** Improve regulatory oversight by instituting an early review process for those regulations that have an annual impact on the economy of at least $1 billion. This will allow more time for the OMB and the public to evaluate the various regulatory options (including time to institute and enforce Proposals A and B), so that the CBAs can serve as inputs to regulatory decision-making, rather than simply justifying decisions already made.

Chapter 2: Background

WHY USE COST-BENEFIT ANALYSIS?

In environmental policy, there is a distinction between market and nonmarket mechanisms. Market mechanisms such as a pollution tax or a cap-and-trade system set a price for emissions and allow a great deal of flexibility in how markets respond to that price. Market participants are provided with an incentive to reduce pollution but are allowed the flexibility to decide how to reduce it, which leads to the lowest-cost pollution control actions. Firms for which emissions are a valuable component of the production process may continue to emit while effectively paying other firms to undertake additional pollution abatement at lower cost. In contrast, nonmarket regulations, known as command-and-control regulations, limit the discretion that polluters have in choosing how to reduce emissions. These regulations can take the form of technology standards that prescribe the types of pollution control technologies that must be used. These standards offer little or no flexibility to choose actions that might lead to the same emissions reduction at lower cost. Performance standards that prescribe rates, such as emissions or fuel use per unit of output, are slightly better than technology standards in that they allow some within-firm flexibility. But these command-and-control approaches have been demonstrated to be more costly than the market-based regulations.

It is important to evaluate any type of environmental regulation using CBA, but the need is especially acute to evaluate command-and-control regulations, given their potential for much higher societal costs. The conceptual foundations of using CBA for regulatory policy-making are well established. Basing regulatory decisions on CBA is preferable to basing them on other approaches because CBA explicitly considers the inevitable trade-offs between the benefits of government intervention and the resulting costs imposed on the regulated. The CBA approach undoubtedly leads to some uncomfortable conclusions, in that reducing some pollutants can be deemed not worth the cost.[2] For example, CBA might conclude that the cost of requiring a factory to eliminate a pollutant—forgone income, lower output—might not be worth a small level of health benefits from reduced pollution. But an alternative goal of eliminating all environmental risks irrespective of costs is infeasible and unhelpful: for many pollutants, elimination would require a reduction to zero emissions, which would only be achievable by shutting down economic activity. A zero-risk regulatory approach is therefore impossible, not least because the population or its elected representatives would never abide by the results. Any statute or regulation motivated by the zero-risk approach must inevitably confront the problem of costs, as represented by a reduction in valuable goods and services.[3] It is preferable to consider costs openly and explicitly (as is the goal of the CBA approach) rather than through an opaque and less accountable process (such as the process that results from the nonattainable zero-risk approach).

Another alternative approach to environmental regulatory decision-making is the technology-based approach. Under this approach, the regulator mandates that polluting firms install "state-of-the-art" emissions control technology. This approach is similar to the zero-risk principle, in that it too fails to consider cost trade-offs, and therefore risks having the regulator face the political or economic impossibility of prescribing a technology that is prohibitively expensive. The technology-based approach also is intrinsically a more costly approach because it locks firms into particular pollution control technologies, eliminating regulatory incentives to reduce pollution through other means, such as developing pollution control technologies that are more innovative, or through conservation or lowered production.

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BOX 1

The Regulatory Process

Regulations are the means by which executive branch agencies implement, interpret, or prescribe laws or policies. In the case of environmental policy, it is the EPA that typically promulgates regulations to implement environmental laws such as the Clean Air Act. The regulatory process is the system in which regulatory options are considered, proposed, and ultimately finalized by the agency. For significant regulations, this entails a process of interagency review, headed by OMB's Office of Information and Regulatory Affairs (OIRA); OIRA also issues guidance to the agencies in how to conduct their assessments of the regulatory alternatives.

CBA is a well-established principle within this existing regulatory policy structure. President Carter's Executive Order 12044 required that agencies quantify the benefits and costs of regulations. President Reagan replaced 12044 with Executive Order 12291, which was the first to require that agencies explicitly consider the costs involved with major regulations. (Major regulations were defined as those with an annual effect on the economy of at least $100 million.) The order stated, "Regulatory action shall not be undertaken unless the potential benefits to society for the regulation outweigh the potential costs to society," and "Regulatory objectives shall be chosen to maximize the net benefits to society." The executive order also required agencies to conduct an RIA for every major regulation, and placed the institutional authority for regulatory oversight within the OMB.

President Clinton replaced 12291 with Executive Order 12866, which slightly amended the cost-benefit criterion: "Each agency shall assess both the costs and the benefits of the intended regulation and . . . propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs." Thus, the criterion shifted from benefits outweighing costs to benefits justifying costs. And whereas 12866 echoed the language of 12291 in stating, "Agencies should select those approaches that maximize net benefits," 12866 explicitly included "distributive impacts" and "equity" as components of net benefits. Most recently, President Obama's Executive Order 13563 reaffirmed the principles established in 12866, including that agencies should propose or adopt a regulation only if "benefits justify its costs" and that they include such things as "distributive impacts" and "equity" in computing net benefits.

These executive orders indicate that the executive branch has fully endorsed the use of CBA within regulatory policy-making. Of course, agencies can use CBA as a basis for decision-making only to the extent that it is allowable by law. Most of our environmental and safety laws emerged thirty to forty years ago, predating the imperative placed on CBA in the executive orders. These statutes include the Clean Air Act Amendments of 1970 and 1977, the Occupational Safety and Health Act of 1970, the Federal Water Pollution Control Act Amendments of 1972, the Clean Water Act of 1977, the Resource Conservation and Recovery Act of 1976, the Toxic Substances Control Act of 1976, and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980. The language in these statutes frequently establishes broad goals to be promoted by the regulatory agencies, reflecting more of a zero-risk approach or technology-based approach to regulation than a CBA approach. These broad goals create some ambiguous guidance within the statutes. For example, the Clean Air Act states that standards for common air pollutants should be set at levels that achieve an "adequate margin of safety," although standards for hazardous air pollutants should be set at levels that achieve an "ample margin of safety." The goal of the Occupational Safety and Health Act of 1970 is "to assure so far as possible every man and woman in the Nation safe and healthful working conditions."

In many cases, judicial review of these ambiguous statutes has determined that agencies are not permitted to base decisions on CBA. For example, the Supreme Court interpreted the Occupational Safety and Health Administration's (OSHA) enabling legislation regarding the technical feasibility of compliance as "capable of being done," which precludes the agency from considering costs.[4] And the DC Court of Appeals ruled that the EPA "is not permitted to consider the cost of implementing [air quality standards]."[5] In other cases, judicial review has supported agency consideration of costs. For example, the DC Court of Appeals ruled that OSHA was allowed to use CBA in promulgating its regulations.[6]

REGULATING GREENHOUSE GASES

Perhaps the most controversial recent judicial review to resolve an ambiguity of an environmental law was the 2007 Supreme Court decision that found that the EPA has the authority to regulate tailpipe emissions of greenhouse gases, since such gases "fit well within the Clean Air Act's capacious definition of 'air pollutant.'"[7] The Court also found that the EPA's rationale for not regulating greenhouse gases was inadequate and required that the EPA articulate a reasonable basis to avoid regulation. The EPA later found that six greenhouse gases "may reasonably be anticipated both to endanger public health and to endanger public welfare," thus requiring a regulatory response under the Clean Air Act (EPA 2009). This finding by the EPA triggered regulations for mobile sources of pollution, which in turn initiated a process of using the Clean Air Act to regulate stationary sources of greenhouse gases.

Regulation of greenhouse gases presents significant challenges, especially given the widespread nature of such emissions in a modern economy that heavily relies on energy generation from fossil fuels. Even the most cost-effective approach to meaningful greenhouse gas reductions—such as a carbon tax—would entail significant economic costs. Unfortunately, the Clean Air Act primarily relies on technology-based regulatory standards, which are a much costlier (and less effective) means of achieving emission reductions, because they close off the possibility of polluters searching for other low-cost options for curbing emissions. Similarly, reducing greenhouse gases through energy-efficiency standards promulgated by the EPA under the Clean Air Act or the Department of Energy (DOE) under the Energy Independence and Security Act of 2007 will incur heavy costs, given the piecemeal nature of this approach, which applies different regulations for new versus existing sources, and different regulations based on geographic location and type of use. The increasing likelihood that greenhouse gas reductions will be strictly attempted through technology standards or energy-efficiency standards makes it even more critical that CBA—properly used—play a large role in regulatory decision-making. Regulations that fail to efficiently deliver reductions in greenhouse gases could erode political support for EPA regulation of these pollutants.

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Chapter 3: Objective: Improve the Use of Cost-Benefit Analysis within the Regulatory Process

Although the conceptual argument for using CBA within the regulatory process is strong, there are existing problems with how it is used in practice. The RIA process does not focus enough attention on the validity of the empirical claims underlying most CBAs, and does not foster transparency, replication, and broader evaluation of these empirical claims. Additionally, there has been a recent methodological shift in RIAs, in which mandates for products that are more energy-efficient (and more expensive) are assumed to produce private benefits to those who are subject to the regulation. This methodological shift can have large consequences and thus deserves more scrutiny.

We need a systematic approach to addressing the empirical and methodological challenges faced in CBAs. Whereas the innate limitations of empirical research make such challenges unavoidable, they are especially prevalent in the prospective studies currently used within the regulatory process. Prospective studies are conducted *before* a regulation is implemented, which is the point at which we know the least about them. I propose three changes to the regulatory review process in order to improve the credibility of the CBAs, which in turn should lead to a more cost-effective use of our regulatory budget:

- **Proposal A:** Require the use of a checklist of good empirical practices and promote decentralized evaluations of data and research, both of which will provide information for subsequent retrospective analyses.
- **Proposal B:** Exclude private net benefits from CBAs for energy-efficiency standards.
- **Proposal C:** Improve regulatory oversight by instituting an early review process for those regulations that have an annual impact on the economy of at least $1 billion. This will allow more time for the OMB and the public to evaluate the various regulatory options (including time to institute and enforce Proposals A and B), so that the CBAs can serve as inputs to regulatory decision-making, rather than simply justifying decisions already made.

Although the conceptual argument for using CBA within the regulatory process is strong, there are existing problems with how it is used in practice.

Proposal A: Require a Checklist of Empirical Practices and Promote Decentralized Evaluations of Data and Research

THE FUNDAMENTAL PROBLEM OF CAUSAL INFERENCE

The usefulness of any environmental regulation rests squarely on the reliability of the estimates of the benefits and costs of reducing the targeted pollution. The biggest challenge arises in estimating the benefits of an environmental regulation—for example, the effect a given reduction in a specific pollutant has on the health of affected individuals—because this requires an understanding of the causal relationship between that pollutant and an array of health outcomes. In medicine, for instance, we establish a causal relationship between a treatment and a health outcome using a randomized controlled trial. By randomly dividing people into two groups and comparing the health outcomes after one group has received the treatment, we can be relatively sure that any differences in health in the two groups are caused by the treatment.

When examining environmental effects, such experiments are seldom possible for practical or ethical reasons. In the world of the possible, empirical analysts instead tend to compare health outcomes of those exposed to the higher level of pollution to health outcomes of those exposed to the lower level of pollution. This approach faces the problem that there may be other important differences between the groups of people. For example, pollution levels in central cities, where the local population tends to be lower income, tend to be higher than in outlying suburbs, where residents are wealthier. Thus a comparison of high-pollution groups to low-pollution groups, in this example, would tend to compare the health outcomes of low-income people to high-income people—people well known to have very different life expectancies. Moreover, it would be misleading to attribute the differences in health outcomes to the different pollution levels. Analysts can attempt to control for the differences in characteristics, but there is a growing consensus among applied economists that this is unlikely to be a reliable approach (e.g., Angrist and Krueger 1999; LaLonde 1986). In the field of environmental economics, for example, Chay and Greenstone (2003) show that the traditional approach of using cross-sectional data to estimate the relationship between total suspended particulates and infant mortality results in a wide variability of the estimated impact (including both positive and negative relationships), depending on which year is examined and which control variables are included.

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The implication of the fundamental problem of causal inference is not that all empirical analyses are incorrect and misleading. Rather, the problem highlights the need for careful choice and scrutiny of the research design used to evaluate a causal link between treatment and outcome. Randomized studies of the effects of pollution (or of pollution reduction stemming from regulation) face ethical objections, although perhaps less so where the effect of the treatment is unknown. Nonetheless, there are alternative approaches to evaluating causal links, such as "quasi-experiments," in which a researcher relies on circumstances outside her control to mimic random assignment to the treatment and control groups. An example might be a policy with an arbitrarily chosen income level for eligibility, so that people who just make the cut-off are statistically identical to those who just miss the cut-off, except that the former is exposed to the treatment.[8]

The broader point is that better research designs more credibly address the empirical problems described above, so any CBA that relies on empirical studies (as all must) needs to assess the credibility of the causal claims in these underlying studies. Unfortunately, there is not a definitive statistical test of the credibility of a research design in establishing a causal link. However, there is a hierarchy of empirical methods that lend more credence to studies that use randomized experiments, "quasi-experiments," and longitudinal studies that follow the

same individuals or families over time (rather than comparing different groups). In addition, there are other informative ways to scrutinize the sources of differences between treatment and control groups, providing evidence whether they stem solely from the treatment or from confounding characteristics.

PROPOSAL PART 1: CHECKLIST OF GOOD EMPIRICAL PRACTICES

Hahn and Dudley (2007) have shown that a significant number of RIAs conducted by the EPA fail to report some basic information concerning the CBAs, such as whether costs and benefits were monetized, whether they were discounted, and whether alternatives were considered. They, along with others (such as Hahn and Sunstein 2002; and Harrington, Heinzerling, and Morgenstern 2009), have advocated for a summary checklist of good practices (frequently called a "regulatory impact summary") to be included with all RIAs in order to assess quality. For the most part, these proposed checklists have been focused on reporting, rather than on the quality of the underlying empirical studies used within the CBAs.

The OMB does currently provide a checklist "to assist agencies in producing regulatory impact analyses" (see White House n.d.). However, this checklist consists of simple yes/no questions of whether the agency has conducted the steps required (e.g., Does the RIA use an appropriate baseline?). It does not include informative questions about the assumptions used (e.g., What discount was used for the calculations of costs and benefits?) or the findings of the RIAs (e.g., What is the best estimate of the present value of benefits and the best estimate of the present value of costs of this rule?).

I endorse earlier proposals for a more informative checklist that provide summary information about the assumptions and findings of the RIAs. As suggested by Hahn and Sunstein (2002), this would include the following:

- Will the rule have an impact on the economy of $100 million or more?
- What discount rate was used in the calculation of costs and benefits?
- Are costs and benefits adjusted for inflation, and if so, to what base year?
- What is the best estimate of the present value of quantifiable benefits?
- What is the best estimate of the present value of quantifiable costs?
- Which benefits and costs have not been quantified?
- What is the breakdown of costs by type (compliance costs, administrative costs, federal budget costs, local/state budget costs, other costs)?
- What is the breakdown of benefits by type (mortality health benefits, morbidity health benefits, scenic benefits, ecological benefits, other benefits)?
- Were private net benefits included in the CBA? If so, how does the net present value of benefits minus costs change by excluding this component?

But I go further in requiring basic information in order to assess the quality of the empirical studies used in the CBAs. For example, any RIA claiming health benefits of regulating emissions should include a comparison of the statistical distributions of the treatment and control groups for each health study used, noting how many characteristics were available to compare and the proportion of them that were statistically balanced between the treatment and control groups. If the observable characteristics of the treatment group are statistically similar to the observable characteristics of the control group, then we can have greater confidence that those characteristics that cannot be observed are also similar across the two groups, implying that any difference in outcomes is due to the treatment, and is not biased by confounding factors.

RIAs based on low-quality empirical studies would not necessarily be invalid. Rather, these new requirements would motivate agencies to put more weight on higher-quality studies, provide information helpful in prioritizing future retrospective studies, and provide information useful for judicial review.

The checklist therefore would include questions eliciting evidence of good empirical practices, including the following:

- Were all the studies used in the analysis published in peer-reviewed journals?
- For the studies establishing the bulk of the benefits, how was causality established (randomized experiment, quasi-experiment, panel data, repeat cross-sectional data, time-series data, cross-sectional data, theory, anecdote)?
- Do these empirical studies report the average of available variables for treatment and control groups?
- How many of the available variables have statistically significant differences between treatment and control groups?

- Have the empirical studies been replicated by the agency?
- Are all the data and programs publicly available to enable replication by others?

PROPOSAL PART 2: DECENTRALIZED EVALUATIONS OF DATA AND RESEARCH

Current practice is to make the RIAs available for public comment when the regulation is proposed, but these analyses provide little information on the empirical studies that serve as inputs and offer little means for outside analysts to assess the validity of the empirical claims. Requiring all studies used in regulatory proposals to provide information in order to allow for empirical replication will promote decentralized checks on the analyses, quality assessments of the credibility of the empirical claims that are more thorough, better regulations that are more likely to withstand judicial review, and guidance on which regulations to prioritize for retrospective reviews.

Unfortunately, many published studies lack a transparent presentation of the research design and of diagnostic tests of the credibility of the results. The lack of information should be reported in the checklist and the empirical claims of any such study should be presumed of lower quality. But given the magnitude, scope, and influence of regulatory policy-making, the goal should be to provide incentives for transparent presentation of this information. Researchers who hope to have their work influence regulatory policy should make available to the public the raw data, the data used in the final analysis, and the statistical programs used in the analysis.

This movement toward transparency is already occurring in the academic community, where increasing numbers of journals are requiring authors to provide information to allow for outside replication of their work. For example, the *American Economic Review*, the *Journal of Political Economy,* and the *Brookings Papers on Economic Activity* all require the data used in any of their published papers to be "clearly and precisely documented" and "readily available to any researcher for purposes of replication." This means authors must provide, "prior to publication, the data, programs, and other details of the computations sufficient to permit replication." All of this information is then posted on the journals' websites.[9] Given the large impacts that regulations have on the economy, this movement among academic journals toward transparency and fostering replication should be reinforced by the regulatory process.

IMPLEMENTATION

Both the checklist and the disclosure of information to promote replication can be achieved by the OMB providing guidance to the agencies. The OMB can promote compliance by returning to the agencies any proposed regulation that does not meet these standards. Unfortunately, agencies have an inconsistent record of complying with OMB guidance on regulatory review (see Hahn and Dudley 2007; Harrington et al. 2009; and Government Accountability Office [GAO] 1998). A stronger signal can be sent to agencies by adopting these changes through a new executive order. Whether through OMB guidance documents, or through an executive order, these changes will only be effective if the regulatory oversight process is improved, which is discussed below as Proposal C.

Researchers who hope to have their work influence regulatory policy should make available to the public the raw data, the data used in the final analysis, and the statistical programs used in the analysis.

Proposal B: Exclude Private Net Benefits from Cost-Benefit Analyses for Energy-Efficiency Standards

COST-BENEFIT ANALYSIS AND THE ENERGY-EFFICIENCY GAP

CBA is based on the principle that the choices revealed through market transactions express the preferences of rational agents—in other words, that people know what is best for themselves. This deference toward individual rationality suggests a role for government intervention only when private decisions lead to suboptimal societal outcomes, because individuals do not adequately recognize the costs of their decisions on others.

The traditional CBA approach is based on two core principles of neoclassical economics: The first principle is that of consumer sovereignty, in which consumers are presumed best able to make market decisions in their own self-interest. This principle is closely tied to the economic concept of revealed preference, which holds that a consumer only engages in a voluntary market transaction if the benefits she accrues from the purchase outweigh the costs. The second principle is efficiency, in which the goal of any policy is to maximize the spread between benefits and costs. If consumers are presumed rational, then these two principles work together.

Therefore, in traditional CBA the only benefits of regulation are those that arise from social benefits. By encouraging a consumer to purchase a different product, a regulation may make others better off (for example, exposed to less pollution), but the different product cannot be assumed to make the consumer better off. Otherwise the consumer would have bought it in the first place.

The field of behavioral economics, however, has called into question the assumption of individual rationality and has identified examples where well-informed consumers appear to make mistakes based on errors in processing information or biases in favor of certain choices.[10] For example, one study found that, on average, people who bought monthly gym memberships actually would have saved money by paying for each visit (DellaVigna and Malmendier 2006). Another study found that consumers sign up for too many credit cards that have low teaser rates, thinking that they will borrow less once the teaser rate ends than they actually do (Ausubel 1999). Consumers also appear to ignore important information about products they buy. On eBay, bidders appear to focus on the bidding price, ignoring the significant impact that shipping costs can have on the final price (Hossain and Morgan 2006). Similarly, consumers do not fully account for sales taxes on purchases when the price tag only has the pretax price (Chetty, Looney, and Kroft 2009). The order in which choices are given also affects decisions. For example, several studies show that the order that candidates are placed on the ballot impacts which candidate the voter chooses (Ho and Imai 2008).

One should be cautious about overstating the conflict between the traditional neoclassical approach to economics and the behavioral economics approach.[11] All economists rely on logical analyses and empirical tools to make inferences about the economy and economic policies, and all acknowledge the impossibility of modeling the infinite facets of human behavior, and therefore the necessity of relying on simplifying assumptions. Behavioral economics, for the most part, is about finding the systematic deviations from rational behavior and integrating them into economics. Nonetheless, the evidence of systematically irrational behavior can create a conflict between two core CBA principles. If people are prone to make mistakes, then the preferences they reveal in the market may not be reliable measures of their personal welfare. Therefore, a CBA must choose between incorporating the benefits of a policy that addresses the self-harm done by an individual in a market transaction or respecting consumer sovereignty and thus ignoring such benefits, leading to a violation of the efficiency criterion.

THE ENERGY-EFFICIENCY GAP

This issue is perhaps most prevalent with respect to the question of energy-efficiency regulations, which are frequently promulgated by the DOE, and that are the primary means for the EPA to regulate greenhouse gases under the Clean Air Act. There is a long-standing claim, known as the energy-efficiency gap, that consumers frequently forgo what appear to be cost-effective investments in energy efficiency. The decision to purchase a more energy-efficient product (for example, a household appliance) entails a trade-off between a higher initial capital cost versus lower future energy operating costs. A rational decision-maker will consider such things as the expected future cost of energy, the expected lifetime of the

…a CBA must choose between incorporating the benefits of a policy that addresses the self-harm done by an individual in a market transaction or respecting consumer sovereignty and thus ignoring such benefits…

appliance, the frequency of use of the appliance, and the proper way in which to discount future savings to present value to compare to the capital cost. The energy-efficiency gap is the empirical finding that consumer choices for energy-efficiency purchases imply a discount rate much higher than market discount rates. In other words, the energy-efficiency gap implies that consumers down-weight the future cost savings stemming from an energy-efficient appliance compared to the weight they put on the future in other market settings.[12]

Different reasons have been proposed to explain the energy-efficiency gap, many of them consistent with individual rationality and thus do not create any conflicts within existing CBA practices. For example, many studies suggest that the gap is itself illusory and is due to analytical shortcomings, such as the inability of the researcher to consider other characteristics of the appliance that people may value or of mismeasurement by the researcher of the actual energy savings (see, e.g., Hassett and Metcalf 1993; Hausman and Joskow 1982; and Jaffe, Newell, and Stavins 2004). There also can be market failures that explain the energy-efficiency gap. For example, the builder of an apartment complex might underinvest in energy-efficient appliances if she thinks that incomplete information by the renters will mean she cannot recoup the energy savings through higher rents.[13] There are, of course, economic rationales to address these suboptimal energy-efficiency choices stemming from market failures, which are entirely consistent with the neoclassical framework and the presumption of individual rationality.

Despite explanations of rational reasons for the energy-efficiency gap, the behavioral economics literature provides some evidence—especially in experimental rather than real world settings—that people deviate from rationality in making economic decisions. But the evidence is limited and mixed on the narrower question of whether there are deviations from rationality that systematically lead to suboptimal energy-efficiency choices.[14] Some studies find evidence that people base decisions on which appliances to purchase based on current energy prices rather than on expected future prices, leading to a tendency to forgo purchasing energy-efficient products (Kempton and Montgomery 1982). Others find that the psychological "salience" of the more expensive efficient appliance—in effect, the sticker shock—leads to an underinvestment in energy efficiency (Wilson and Dowlatabadi 2007). But the literature on behavioral economics with respect to energy efficiency is still in its nascent stages, and is unable to consistently demonstrate the magnitude of the contribution of behavioral deviations from rationality rather than from other explanations of the energy-efficiency gap, such as the inability of researchers to capture the full characteristics of the choices and other informational or market failures that can lead to suboptimal energy choices.

RATIONALITY IN REGULATORY COST-BENEFIT ANALYSIS

The traditional approach to CBA relies on revealed preference, meaning that consumers (and producers) are presumed to accrue net gains from any private market transactions in which they engage. This presumption of the validity of revealed preference is explicitly mentioned in the OMB's guidelines (known as Circular A-4; OMB 2003) for conducting regulatory analyses. In considering an example in which emission standards lead to fuel savings, the OMB states, "These fuel savings will normally accrue to the engine purchasers, who also bear the costs of the technologies. There is no apparent market failure with regard to the market value of fuel saved because one would expect that consumers would be willing to pay for increased fuel economy that exceeded the cost of providing it" (White House 2003, 1. Other Benefit and Cost Considerations).

Skeptics of the rationality assumption point to the computational complexity of computing net present value. For example, when deciding between two options for a household appliance, the consumer must consider the cost of each product (including installation cost), the expected lifetime of the product, the expected maintenance costs over the life of the product, the expected energy expenses over the life of the product (which depends on expected energy prices), and the discount rate that makes future dollars comparable to current dollars.

But those who rely on the rationality assumption and revealed preference do not assert that individuals are infallible in making this kind of net present value computation. Rather, the assumption is that in most contexts consumers are better equipped than regulators at making market decisions that

affect themselves. The computational complexity also exists for the regulator. For example, the cost-benefit analysis of regulations recently proposed by the DOE attempted to compute the net present value to consumers of different residential dishwashers, dehumidifiers, cooking products, and commercial clothes washers (see DOE 2009a, Ch. 8; and DOE 2009b, Ch. 8). As shown in Table 1, this analysis involved making numerous assumptions about inputs to the net present value calculation.

In assessing electric and gas cooktops, for example, the DOE needed to make assumptions on such things as usage, energy prices, repair and maintenance costs, the lifetime of the products, and the discount rate. Similarly, in assessing top-loading and front-loading commercial clothes washers for laundromats, the DOE needed to make assumptions on such things as usage, annual energy use, annual water use, the lifetime of the products, and other issues such as energy prices, water and wastewater prices, and repair and maintenance costs. Through its net present value analysis, the DOE finds both that a switch to the more efficient type of gas cooktop provides an average cost savings of $15 and that a switch toward the more-efficient type of top-loading commercial clothes washers for laundromats provides an average cost savings of $190.

DOE's analysis presumes that the regulator is better than the consumer at computing the various inputs to the net present value computation. That means that DOE regulators decide which characteristics of the products are deemed valuable by consumers and apply those decisions to all consumers. The DOE also must determine how much future benefits are valued today by choosing a discount rate. Interestingly, the DOE assumed a different discount rate for commercial

TABLE 1

Input Assumptions Used by the Department of Energy to Compute the Value of Various Appliances

	Commercial Washing Machines		Cooktops	
Type	Top-Loading	Front-Loading	Gas	Electric
Usage	6 cycles/day	6 cycles/day	1.29 meals/day	1.22 meals/day
Annual water use	58,300 gallons	49,100 gallons	NA	NA
Annual energy use	4867 kWh	3565 kWh	2.74 MMBtu	128.2 kWh
Energy prices	10.8 c/kWh	10.8 c/kWh	14.99 $/MMBtu	10.5–11.7 c/kWh
Repair and maintenance costs	$82.59–$89.97 per year	$40.05–$55.11 per year	$126–$178 in 10th year	N/A: no cost increase
Discount rate	5.7%	5.7%	5.4%	5.4%
Lifetime	7.125 years	7.125 years	19 years	19 years
Cost savings from switching to more efficient version	$190.00	$216.10	$15.00	$4.30

Source: DOE 2009a, 2009b.

Note: Water and energy usage figures displayed are for the baseline product only. The usage figures differ for more energy-efficient products.

clothes washers than for the cooktops. Unlike the behavioral economics literature, which attempts to identify systematic deviations from rationality and integrate them into economic modeling, the DOE does not offer any clear and systematic justifications for the presumed deviation from the revealed preference approach. The resulting private net benefits represent the bulk of the benefits of the energy-efficiency standards.

This is also the case for fuel economy standards for passenger cars and light trucks, as promulgated by the EPA and the DOT. The RIA for this rule indicates that 88 percent of the gross benefits stem from private savings to consumers in the form of fuel savings, benefits of increased driving, and reduced refueling time (see DOT 2009). Energy-efficiency regulations and fuel economy regulations are therefore justified by such CBAs only by presuming that consumers are unable to make market decisions that yield personal savings, that the regulator is able to identify these consumer mistakes, and that the regulator should correct economic harm that people do to themselves.

PROPOSAL: EXCLUDE PRIVATE NET BENEFITS FROM COST-BENEFIT ANALYSES FOR ENERGY-EFFICIENCY STANDARDS

The inconclusiveness of the behavioral explanations for the energy-efficiency gap—and for other applications in environmental economics more broadly—suggests that regulators should proceed with extreme caution before making it the basis for justifying costly rules. But even if empirically consistent findings are forthcoming, we should be extremely wary about discarding the principle of consumer sovereignty as a basis for regulatory policy-making. Abandoning the principle of consumer sovereignty would shift regulatory policy from an emphasis on mitigating harm individuals impose on others towards a paternalistic emphasis on mitigating harm individuals impose on themselves.

And if the individual does not decide what is best for herself, who will? The normative implication of behavioral economics is that this would fall to the regulator, expert, or policy-maker. Given the informational and analytical challenges of finding behavioral failings among heterogeneous individuals, this is a tall order for any of them to fill, especially given that they, too, are prone to informational and behavioral failings. Indeed, a GAO (2010) report on a program (run by the EPA and the DOE) to promote energy-efficient appliances found that the program was vulnerable to fraud and abuse, including the granting of energy-efficient status to many bogus products. Additionally, as noted by Glaeser (2006, p. 32), "If humans make mistakes in market transactions, then they will make at least as many in electing representatives, and those representatives will likely make mistakes when policymaking."

It seems decidedly premature to presume regulator rationality alongside consumer irrationality. Indeed, the public choice literature suggests that regulator rationality will tend toward promoting inefficiently large government interventions, suggesting that a shift away from the principle of consumer sovereignty serves regulator (rather than societal) self-interest (see, e.g., Niskanen 1971).

Of at least equal importance, a shift away from the principle of consumer sovereignty will overemphasize less-effective environmental regulations. For example, a presumption that people irrationally underconsume energy-efficient appliances would place greater weight on energy standards than on other mechanisms that more effectively target environmental pollutants (e.g., pollution taxes or cap-and-trade). This would mean less-effective pollution control because energy-efficiency standards do not promote conservation; indeed, there is some evidence—known as the rebound effect—that people use products more when they become more fuel efficient (e.g., Gillingham, Newell, and Palmer 2006). Energy-efficiency standards also apply only to new products, which can create incentives to retain older (and thus less-fuel-efficient) products (see, e.g., Stavins 2006). And it would mean more-expensive pollution control because energy-efficiency standards on each product offer less flexibility on how to achieve pollution reductions compared to price mechanisms.

IMPLEMENTATION

Private net benefits should be excluded from CBAs, especially for those evaluating energy-efficiency standards. This directive can be achieved through OMB guidance to the agencies in conducting their RIAs. The presumption should be that any private savings accruing to an individual from a regulation that mandates products that are more energy-efficient are not benefits within CBA unless a specific market failure can be demonstrated for the perceived, individual suboptimal choice. Excluding private net benefits would lead to more-accurate CBAs—for example, demonstrating that the DOE's energy-efficiency standards for appliances accrue costs in excess of benefits. This emphasis toward consumer sovereignty would not require an executive order; rather, it can be solidified in OMB guidelines to the agencies in how they must conduct their RIAs.

Proposal C: Improve Regulatory Oversight Through an Early Review Process for Major Regulations

PROPOSAL: EARLY REVIEW PROCESS FOR MAJOR REGULATIONS

The changes advocated in Proposals A and B will only be effective if the regulatory oversight process is improved. OMB guidance documents—or even executive orders—adopting these proposals would face the problem with the existing oversight process, which is that OMB review typically is performed after the agency has more or less developed the proposed and final rules. The OMB frequently receives RIAs for proposed or final rules from the agencies with little time to require substantial changes, due to delays by the agencies coupled with deadlines imposed by statutes or court orders. This delay effectively results in a review process in which the regulating agency conducts a self-evaluation, which is problematic, given the tendency of people deeply involved in implementing a policy to see the benefits of such a policy far more clearly than they see the costs. This subverts the goals of regulatory review, and instead makes it more an exercise in supporting decisions that have already been made rather than informing and contributing to the decision-making process.

In order to foster compliance with the checklist on reporting and empirical practices, greater transparency, and dissemination of data, and the methodological guidance on private benefits, the OMB should adopt a formal early review process that would allow at least six months of review in advance of proposed and final regulations.[15] This formal designation by the OMB would trigger a thorough interagency review process, which would evaluate the different regulatory options and develop a credible RIA needed to inform decision-making. Current practice, under Executive Order 12866, applies to regulations that have an annual economic impact of more than $100 million. Given the limited resources available to the OMB to conduct a more thorough and informative early review process, the new executive order should be limited only to those regulations that have an annual economic impact of more than $1 billion. Additionally, the OMB (as delegated to its director of the OIRA), should have discretion to mandate an early review process for influential regulations that agencies are considering. Restricting the early review process to these more-significant regulations (approximately twenty per year) will limit the additional burden on OIRA staff, which is the office that oversees the regulatory process for the OMB. Nonetheless, in order for the early review process to achieve its goals, more staffing for OIRA will likely be necessary.

By focusing on this more limited set of significant regulations, the early review process will allow more time for compliance with the regulatory checklist, the disclosure of data to promote replications, the decentralized public response to data and analyses, and greater overall scrutiny of the CBAs used within the RIAs. As with the current process, agencies would be required to conduct RIAs for their proposed regulations, subject to existing OMB guidelines and feedback, and subject to the OMB's discretion to reject inadequate analyses. But, unlike the current process, agencies would need to allow six months of review for their draft RIAs, which would make the OMB's requirement more enforceable, thus allowing for a more thorough vetting of the various regulatory options.

Finally, the early review process, with its greater emphasis on empirical quality review and data dissemination, will provide information useful for retrospective reviews of existing regulations. The recent Executive Order 13563 calls on agencies to "promote retrospective analysis of rules that may be outmoded, ineffective, insufficient, or excessively burdensome, and to modify, streamline, expand, or repeal them in accordance with what has been learned." In addition to

providing useful information for these retrospective reviews, the early review process can serve as a model in which the director of the OMB's OIRA can designate impactful *existing* regulations for a thorough assessment and reevaluation.

IMPLEMENTATION

An early review process—both for new regulations and for retrospective assessments of existing regulations—can be adopted through an executive order. But even with a new executive order, there remains the risk that the OMB will have difficulty enforcing the six-month review requirement, especially if presented with legislative deadlines to enact a regulation. A more reliable and complete approach to improving regulatory oversight would require congressional action. As noted earlier, the use of CBA—and the subsequent usefulness of the regulatory review process—is constrained by existing laws, many of which forbid the consideration of the costs of regulations. A more thorough reform of the regulatory review process, therefore, would have Congress mandate that regulations meeting the $1 billion threshold be subject to the six-month early review process (and existing regulations meeting this threshold be subject to a similar six-month retrospective process), and would have Congress allow the use of CBA as a basis for decision-making for all regulations meeting this threshold.

Without addressing the empirical and methodological challenges to CBA, we risk a substantial misallocation of our regulatory dollars. In order to address these challenges, we also need to improve the regulatory oversight process. The current system does not allow enough time for disinterested review or for enforcement of analytical requirements, meaning that CBA is more frequently used to justify agency decisions than to serve as useful inputs to decision-making. President Obama's recent Executive Order 13563 is helpful in tackling some of the problems with CBAs, in that it calls for retrospective analyses of existing regulations. Retrospective analyses allow for more-thorough and more-credible assessments of the effectiveness of regulations. Nonetheless, the call for retrospective analyses will only be helpful if there is capacity within the regulatory oversight process to prompt retrospective analyses, offer guidance on how to conduct such analyses, and enforce regulatory responses to the findings.

Without addressing the empirical and methodological challenges to CBA, we risk a substantial misallocation of our regulatory dollars. In order to address these challenges, we also need to improve the regulatory oversight process.

Questions and Concerns

ARE COMMAND-AND-CONTROL REGULATIONS PREFERABLE TO MARKET-BASED MECHANISMS SUCH AS A POLLUTION TAX OR A CAP-AND-TRADE SYSTEM?

Market-based mechanisms are preferable because the key source of many environmental problems is the lack of ownership over environmental goods such as clean air. If society could create a property right for, say, "clean air," to be held by individual citizens, then any action that involved polluting the air would require the consent of the right's owner who would require compensation for any damages (Coase 1960). However, because no one owns the right to clean air, no one person has the incentive to protect it. The result is that there is no price levied on polluting the environment, and this zero price leads to over-pollution. This observation points to the clearest role for the government in formulating environmental policy: to set a price for pollution.

The most straightforward way to set a price is through a pollution tax. As first argued by Pigou (1920), a tax on pollution provides an incentive for polluters to reduce emissions and thereby economize on its use of the environment. A second approach to pricing pollution, known as cap-and-trade and first suggested by Dales (1968), is to set a quota on allowable emissions and to require that each source of pollution submit a permit (the sum of which equals the quota) for each unit emitted. The quota creates a shortage of permits (which are transferable), thus generating a positive price for the permits, which establishes a price for pollution.

The pollution tax and cap-and-trade are known as market-based regulations. Their superiority compared to other approaches stems from the flexibility they bestow on how to reduce pollution. Market participants are provided with an incentive to reduce pollution but are allowed flexibility to decide how to do so, which leads to the lowest-cost pollution control actions. In contrast, nonmarket regulations, known as command-and-control, limit the discretion that polluters have in choosing how to reduce emissions. These regulations can take the form of technology standards that prescribe which pollution control technologies must be used. These standards offer little or no flexibility to choose actions that might lead to the same emissions reduction at lower cost. Performance standards that prescribe rates, such as emissions or fuel use per unit of output, are slightly better than technology standards in that they allow some within-firm flexibility. But these command-and-control approaches have been demonstrated to be more costly than the market-based regulations.

HOW SHOULD WE ADDRESS DISTRIBUTIONAL CONCERNS?

The efficiency criterion attempts to pick a regulation in which the benefits to the winners maximally exceed the costs to the losers. The conceptual appeal of this approach is that the winners could compensate the losers, leaving enough such that no one is made worse off by the regulation. The optimal approach, therefore, is to use CBA to choose the most efficient regulation, which means growing the broadly defined "economic pie" as large as possible, and then to use the tax code to redistribute the slices of this pie equitably so that no one is made worse off. In practice, regulatory policies are not directly linked to offsetting transfers through the tax code. This means that the efficiency approach can create inequities, insofar as the tax code does not redistribute income to those who are net losers of regulatory policy-making.

The distributional concern, however, does not invalidate the desirability of the CBA approach to regulatory decision-making.[16] Rather, it suggests that CBA should include a full accounting of the benefits and costs of regulatory options on specific demographic groups. Equity considerations can then be substituted for economic efficiency by assigning different distributional weights to benefits and costs of subpopulations affected by the regulation.[17] The CBA approach, in fact, is even better equipped than the zero-risk or technology-base approaches at addressing distributional concerns. Unlike these other approaches, it explicitly accounts for regulatory costs, including those costs that fall on disadvantaged groups. Also, CBA is better equipped to take full account of all the effects of regulations on different populations. For example, a naïve approach might promote an expensive environmental regulation to address pollution in a disadvantaged neighborhood. A CBA approach would examine the indirect effects this regulation would have on land markets. For example, such an environmental regulation could increase the demand for housing in this neighborhood, leading to gentrification and a pricing of the disadvantaged out of the rental market (see, e.g., Banzhaf and Walsh 2008; Sieg, Smith, Banzhaf, and Walsh 2004). By accounting for the full benefits and costs of regulatory options, CBA is best equipped to evaluate the economic efficiency and equity implications of regulatory decisions.

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Endnotes

1. This criterion is known as the Kaldor-Hicks criterion. It is based on the work in the 1930s and 1940s of British economists Nicholas Kaldor and John Hicks. The Kaldor-Hicks criterion is a weaker, but more applicable, version of the Pareto improvement criterion (named for turn-of-the-century Italian economist, Vilfredo Pareto), in which a policy is to be undertaken if it improves the well-being of at least one person without reducing the well-being of any other person.

2. Some object to CBA on ethical grounds (see, for example, Kelman 1981). For responses to ethical critiques, see, for example, Solow (1981), as well as Revesz and Livermore (2008). Arrow et al. (1996) provide eight useful principles on the use of CBA.

3. See Portney and Stavins (2000) for examples of environmental policies that are based on the zero-risk approach. The reduction in goods and services resulting from a regulation could include forgone health, suggesting that a zero-risk approach could even incur costs that lead to a net reduction in public health. See, for example, Hahn, Lutter, and Viscusi (2000); these authors find that more than half of the twenty-four regulations studied were likely to cause an increase in mortality risk. See also Viscusi and Gayer, 2005, for an overview of this "risk-risk" literature.

4. See American Textile Manufacturers Institute, Inc. v. Donovan, 452 U.S. 490 (1981).

5. See DC Court of Appeals, American Trucking Associations, Inc. et al. v. US Environmental Protection Agency 97-1440 (1999).

6. See DC Court of Appeals, UAW v. Occupational Safety and Health Administration, 938 F.2d 1310 (1991).

7. See Massachusetts v. EPA, 549 U.S. 528-29 (2007).

8. See Greenstone and Gayer (2009) for a discussion of quasi-experiments, especially as they pertain to environmental analyses.

9. Scientific journals have also adopted policies to foster replication of published analysis. The journal *Nature* has the following as a condition of publication: "Authors are required to make materials, data and associated protocols promptly available to readers without undue qualifications in material transfer agreements." The *Proceedings of the National Academy of Sciences* requires authors to "make materials, data, and associated protocols available to readers" in order to "allow others to replicate and build on work" published in the journal.

10. For an excellent summary of behavioral economics, see DellaVigna (forthcoming).

11. For example, as noted by Smith (2003), economists since Adam Smith have viewed economic values as broader than would be implied by strict self-interested rationality.

12. For an early example, see Hausman (1979). See also Sanstad, Hanemann, and Auffhammer (2006).

13. Along similar lines, Levinson and Niemann (2004) find that tenants whose electric bills are included in their rent consume much more electricity than those who pay their own bills.

14. A finding that people deviate from rational behavior in a laboratory or field experiment does not necessarily imply that it will occur in a market setting. Indeed, Becker (2002) portrays skepticism about behavioral economics for this very reason, noting, "There is a heck of a difference between demonstrating something in a laboratory, in experiments, even highly sophisticated experiments, and showing that they are important in the marketplace" and, "Some defects in behavior claimed by behaviorists tend . . . to be eliminated in an exchange economy." See, for example, Shogren and Taylor (2008), and Gillingham, Newell, and Palmer (2009) for overviews of the literature.

15. An early review process was recommended by Harrington et al. (2009), and by Fraas (2009).

16. See Banzhaf (2011) for a full discussion of incorporating distributional concerns in CBAs.

17. Distributional weights for costs and benefits were once commonplace in the CBA literature for developing countries (see Pearce 2000).

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Highlights

Ted Gayer of The Brookings Institution proposes three reforms that would enhance the use of cost-benefit analysis in developing environmental regulations.

The Proposal

Proposal A: Require a checklist and release of data and methods. Agencies would assess the reliability of the empirical studies used for cost-benefit analysis by referring to a checklist of good empirical practices. There also would be a mandate for releasing the data and methods used to produce the studies that regulators rely on.

Proposal B: Exclude "private net benefits" from cost-benefit analysis. Environmental regulations, especially those covering fuel economy and energy efficiency, should exclude private benefits from cost-benefit analyses unless a clear market failure can be demonstrated.

Proposal C: Improve the regulatory review process. A six-month early review process should be established for major regulations, including those that are expected to have an impact of more than $1 billion plus others chosen at the OIRA director's discretion.

Benefits

These proposals would help make cost-benefit analysis more robust, reduce reliance on questionable assumptions, and enable cost-benefit analysis to have greater influence on the regulatory decision-making process. The result would be better protection of health and the environment at a lower economic cost.

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