Evaluating Regulatory Impact Analyses

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March 2004 • Discussion Paper 04–04

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Abstract

Federal agencies in the United States are required to prepare regulatory impact analyses (RIAs) for every major regulatory action they undertake. Increasingly, other OECD countries are imposing similar requirements. However, there has been little examination of the quality of these documents or of the uses to which they have been put in the regulatory process or elsewhere. In this paper we survey previous efforts to evaluate RIAs and find a fair amount of evaluation of RIAs as stand-alone documents, but much less evaluation of their contribution to producing better regulations.

Key Words: regulation, RIA, benefit-cost analysis, cost-effectiveness analysis

JEL Classification Numbers: H11, H43

Acknowledgements

We are grateful for funding provided by the Organization for Economic Cooperation and Development (OECD). This paper was prepared for an Expert Meeting on "Regulatory Performance: *Ex-post* Evaluation of Regulatory Policies," convened by the OECD on September 22, 2003. We also wish to thank OECD staff members for comments on an earlier draft.

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1. Introduction

The criteria for assessing the success or failure of regulatory impact analyses (RIAs) are not well established in the literature. One widely accepted basis for evaluation is the academic-style quality when the RIAs are treated as stand-alone documents. Another important basis for evaluation is the accuracy of the implicit predictions the RIAs make about regulatory outcomes. Although both of these considerations are important, the present paper argues that RIAs should also be judged in a larger context: whether they advance the objectives of the overall regulatory process.

In making these judgments a number of different issues must be considered. Since it is impossible to evaluate an RIA without an understanding of where such analyses fit in the overall regulatory process we will start with the origin of RIAs, their purposes, both stated and unstated, and the various uses to which they have subsequently been put. We take most of our examples of RIAs and discussion of their use from the federal government of the United States, where the RIA requirement is oldest and best established. Similarly, most of our examples concern environmental policy, but we believe our arguments are applicable to other policy areas.

2. What is Regulatory Impact Analysis?

A perhaps apocryphal story has it that the state legislature in Georgia, in order to simplify calculations made by engineers, architects, and others, once decreed that the value of π was

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henceforth to be 3. Usually, however, public policy is not made with this degree of whimsy, especially in democratic governments. Usually policymakers want some assurance that the cure will not be worse than the disease. It is this desire that creates a demand for impact analysis of governmental actions.

More specifically, regulatory impact analysis has come to mean the use of economic analysis—in particular benefit–cost analysis or cost-effectiveness analysis—to examine the implications of government regulations. Although the typical RIA examines a proposed health, safety, or environmental regulation directed against the behavior of private firms, RIAs have also been used for other kinds of regulations (e.g., bankruptcy) and against other types of actors, such as subordinate governmental units or public enterprises (e.g., publicly owned wastewater treatment plants).

The RIA was first used as a formal government requirement in the United States. In 1981, one of the earliest acts of the Reagan administration was to require each "major" proposed federal regulation to be accompanied by an assessment of benefits and costs and an examination of alternatives to the proposed regulation. Such regulations were also subject to review by the influential Office of Management and Budget (OMB). Centralized review imposed common practices and quality standards across all executive agencies. It contested congressional influence over regulatory decisionmaking, which was growing throughout the 1970s as a result of the mass of social legislation enacted at this time.[1] The establishment of the RIA requirement in the United States is described in more detail in the Appendix.

3. How RIAs and Regulatory Review Have Changed Rulemaking

Now that some time has passed since RIAs and regulatory review have become important elements of decisionmaking by governments, it is natural that assessments of these tools should

[1] Morris Fiorina (1977) was evidently the first to argue that Congress, interest groups, and Executive Branch agencies were locked in a triangle of self-interest, with interest groups seeking economic rents, members of Congress seeking re-election, and executive agencies seeking bigger budgets, which led to high levels of regulatory activity.

begin to appear. Most of these assessments are based on case studies of the regulatory process. These include Morgenstern (1997), which contains 12 case studies of regulatory processes at the U.S. Environmental Protection Agency (EPA), and Delphi Group (2000), a survey of six case studies of various types of regulation in Canada.[2]

The case study results and the casual observations suggest that well-done RIAs bring new discipline and rigor to the rulemaking process. They force decisionmakers and analysts to think critically about the implications, both positive and negative, of the regulations they propose. While regulatory review doesn't add to the legal hurdles associated with rulemaking, it does place on regulators some (limited) responsibility of explaining why a regulation with negative net benefits should be put into place. For these reasons, successful RIAs are thought to improve the decisions made by government agencies.

Beyond this stated purpose, RIAs can serve several other functions in the rulemaking process. First, the need to prepare an RIA provides regulators with a framework for thinking through the consequences of regulations, determining what they do and do not know about those consequences, and subsequently eliciting information from the regulated community and the general public. Second, the RIA requirement often encourages capacity building in regulatory agencies, which must have expertise in economics, policy analysis, and statistics in order to prepare RIAs or to supervise their preparation by consultants. Third, the completed RIA, in turn, informs and potentially instructs the interested community—the advocates on either side of the issue. As a result of providing this information, RIAs can help set the terms of the debate over the proposed regulation. Of the many disputes that attend the typical regulatory process, the RIA can help determine which are factual and therefore can potentially be resolved by more data and which are philosophical and much less amenable to scientific or technical analysis. Finally, it can induce an improved understanding of the implications of federal regulatory activity by officials in all branches of government. As one close observer in the United States has argued, these

[2] Bankruptcy rules, meat inspection regulations, industrial hemp regulations, motor vehicle safety regulations, energy-efficiency regulations, and gasoline sulfur content regulations.

officials "would know less about regulation than they know now were it not for the development of … a tradition of scrutinizing regulatory proposals" (Portney 1984).

Other studies—statistical studies of large numbers of rules—are less sanguine about the quality of RIAs or the performance of the regulatory review process. Necessarily, such analyses can only focus on a small number of outcomes and cannot approach the level of detail in a case study. For example, Robert Hahn (Hahn 1996, Hahn et al. 2000, 2001) has conducted several surveys of RIAs in the United States, focusing primarily on whether these documents contain all the elements that are essential to a proper analysis. As we discuss further in the next section, his surveys find that many RIAs perform poorly in this respect. Scott Farrow (2000) asks a more utilitarian question, namely, whether the regulatory review process, of which the RIA is an important component, has led to the promulgation of more cost-effective rules, also in the U.S. context. He also found that rules never issued (for whatever reason) were not much less cost-effective than rules that were issued and that the RIA could not be credited with any improvements in cost-effectiveness between the proposed and final rule. This work will also be considered further in a later section.

The effect of RIAs on the overall economic efficiency of regulations is limited in other ways that will not be possible to overcome. First, statutes enabling regulation can expressly forbid the development of regulations on the basis of net benefits, even forbidding in some cases the consideration of costs in setting standards. The U.S. Clean Air Act is a notable example, disallowing cost considerations in the setting of ambient standards, although it does allow costs to be considered when writing source-specific regulations. (Despite this prohibition, RIAs are prepared for ambient air quality standards, such as the recent revision to the primary national ambient air quality standards for ozone and particulate matter.) Second, in the United States at least, the RIA requirement applies only to actions by executive branch agencies. There is nothing in the legislative process that corresponds to the comprehensive evaluation found in a good

RIA.[3] For statutes that provide the authority to write regulations, this means that many important features of regulations could be determined before the regulatory review process begins.[4]

4. Evaluation Methods for RIAs

There are at least three ways to evaluate the performance of RIAs: *content* tests, *outcome* tests, and *function* tests. Each contributes something valuable, and each complements the other two. In this section we examine them in turn.

4.1 Content tests

Content tests are ex ante tests of the material contained in the RIA—i.e., they are assessments that only examine material that was available to the RIA authors at the time the RIA was prepared, even if the assessment itself was prepared long afterwards. Typically, such assessments ask whether the RIA meets the applicable guidelines for preparation of RIAs. For example, current OMB guidelines in the United States require each RIA to do four things: state the need for the proposed regulation, discuss alternatives, assess benefits and costs of each, and explain why the proposed regulation is preferable to the alternatives. (U.S. OMB 2003, Appendix D). Beyond these requirements, content tests examine whether the RIA contains the elements required of a good economic analysis of the issue and whether those elements themselves meet

[3] For important legislation there are often competing bills, each accompanied by reams of analysis and argumentation prepared by supporters and opponents outside of Congress. However, there is no steady source of unbiased information, although academic groups without an axe to grind often weigh in with analyses. One source has suggested that perhaps the closest congressional analogue to the RIA is the committee reports that must accompany each bill reported to the floor of the House and Senate (Personal Communication, J. Clarence Davies, August 2003). Certainly proposed legislation is often subject to close analysis, especially if it is of major import, but there are no requirements to conduct analysis in a certain way or include a comprehensive analysis of benefits and costs.

[4] A U.S. example is the Corporate Average Fuel Economy Standards (CAFE) mandating minimum fuel economy standards in light-duty vehicles, required by the 1975 Energy Policy and Conservation Act. This act explicitly set fuel economy standards for cars and directed the National Highway Traffic Safety Administration (NHTSA) to set them for light trucks. A firm's performance is measured separately for cars and trucks and for each it is the sales-weighted average of the fuel economy of the vehicles (cars or trucks) produced by the company. The averaging provision permits a degree of intrafirm "trading" of vehicle fuel economy, but the trading is limited because neither the averaging of cars and truck performance nor the averaging of all manufacturers' performance is permitted.

acceptable standards of quality. Essentially, these approaches judge RIAs by the standards of applied microeconomics, asking only whether they pass muster as benefit–cost analyses.

All draft and final RIAs are scrutinized for quality by OMB and are subject to remand to the agency for redrafting if they are inadequate. This is one of the methods OMB uses to assure quality and accountability. Observers outside the government have also examined the content of RIAs.

4.1.1 Extensive tests

The most extensive examination of RIA content can be found in ongoing work by Robert Hahn and colleagues. Hahn et al. (2000) examined 48 RIAs in federal agencies in the United States prepared between 1996 and 1999, with particular attention to two aspects: whether they met the legal requirements of the executive order and whether they satisfied the guidelines produced by the OMB. Hahn et al. refer to their method as "scoring"; it essentially is a checklist to determine whether certain items are included.[5]

The authors conclude that many RIAs fail to include items that they regard as essential for a quality product and frequently do not contain the elements required by the executive order. While 90 percent monetized costs, 50 percent monetized benefits, and only 29 percent calculated net benefits. Only two-thirds of the RIAs discussed alternatives to the regulation, and only 25 percent calculated benefits and costs of alternatives. A follow-up on this study (Hahn and Dudley 2002), which also included a sample of earlier RIAs, attempted to discern whether there were differences in the quality of RIAs over time, particularly among RIAs completed during various presidential administrations. (They concluded that there were few differences.)

Hahn et al. also subjected the content to two other tests: whether it was "transparent"—so that the reader could easily find what was being assumed in the analysis and could follow all the calculations—and whether it was internally consistent, so that the same assumptions were used

[5] Delphi Group (2000) contains a much more extensive checklist for RIAs.

throughout. In these areas, Hahn et al. (2000) also found that recent RIAs left much to be desired. The authors' operational tests for these criteria were the presence of an executive summary (only half of RIAs had one) and the treatment of the discount rate (86 percent used the OMB-specified rate throughout).

Hahn et al. are quick to point out that the inclusion of these items is a necessary but not a sufficient condition for a good RIA. If these items are not present, they argue, the RIA can hardly be considered of good quality, for they pertain to matters that are essential for being able to assess regulatory impact. However, an RIA that satisfies the checklist may still be deficient. The fact that so many RIAs omit essential information led Hahn et al. to conclude that RIAs as a group have serious quality problems.

However, Hahn et al. treat all RIAs the same in the analysis. The results might have been different if the RIAs had been weighted by a measure of the economic importance—such as the expected costs or benefits—of the rule. The EPA generally budgets resources for preparation of RIAs in part on the significance of the regulation that depends, in turn, on the anticipated benefits or costs. Arguably, larger budgets should mean higher quality, a supposition generally supported by the RIAs examined in Morgenstern (1997), which we discuss further below. Hahn and his colleagues may be correct that the typical RIA is deficient in a number of areas, but it could also be that the RIAs representing the lion's share of benefits and costs are far from typical.

4.1.2 Intensive tests

In addition to these tests, there are also intensive tests of RIA content, concerned with the quality of the components, rather than simply their existence. At the most basic level, this sort of analysis examines whether the RIA avoids egregious errors, such as double counting of benefits or costs, confusion of costs and expenditures, improper definitions of benefits, failure to distinguish between cost or benefits and transfer payments, improper discounting, and the like. It also examines the transparency and clarity of the RIA. Do the authors explain how they arrived at their conclusions? Can quantitative outcomes be linked to inputs? Are the authors clear what

assumptions they are making? Are those assumptions reasonable? Do the authors define an appropriate counterfactual or baseline?

Certainly, it is not difficult to find extensive critiques of individual RIAs. By far, the majority are submitted during the comment period on proposed regulations by advocacy organizations or research organizations identified with a point of view (e.g., the Center for Progressive Regulation or the Mercatus Center at George Mason University), with the objective of influencing the final regulation. Far less common are RIA evaluations conducted by individuals or organizations whose positions on regulatory matters are not entirely predictable. However, the EPA will sometimes submit internal or contractor-prepared economic analyses in support of a regulation to external peer review.

It is possible to visualize a more systematic approach to real-time evaluation of RIAs by consulting a wide variety of opinion and experience outside the agency. For example, Morgenstern and Landy (1997) describe a "scoping process," in which the agency begins to solicit input from interested parties to identify important issues and approaches as soon as the economic analysis is initiated. Including disinterested experts among those solicited could provide what amounts to a rolling peer review as the RIA is developed. As Morgenstern and Landy put it, "The earlier the analytic template is laid out, the greater its claim to serve as the relative impartial basis for subsequent policy discussion and debate. If it appears only after different parties have advanced their own analyses, it is less likely to guide the debate" (p. 475).

4.2 Outcome tests

Another way of assessing RIAs is to examine the outcomes of regulations ex post and compare actual results to their predicted counterparts in the RIA. If RIAs cannot accurately predict what will happen if the regulation is adopted, they will eventually lose credibility and hence their value in the decisionmaking process. In fact, assessment of RIA performance is only one of two good reasons for conducting ex post analysis; an even more important reason is to assess the performance of the regulation itself.

By some reckonings, ex post analysis is very common in both the European Union (EU) and the United States. There is no shortage of ex post evaluation of regulatory programs in almost every area of public policy. To speak only of environmental policy, we have numerous colleagues at academic centers in the EU who have devoted resources to the examination of regulatory implementation. For example, the Center for Clean Technology and Environmental Policy (CSTM) at the University of Twente in the Netherlands has conducted ex post examination of all Dutch environmental regulation (e.g., Bressers 1991). Researchers at the University of Gothenburg, Sweden, have also analyzed the outcomes of numerous policies in both the European context and also for particular countries (e.g., Hammar and Löfgren 2001). We are also aware that considerable ex post analysis takes place in France, Germany, and the United Kingdom.

In the United States, examination of implementation issues has also captured the attention of numerous academics. Ex post analysis has also been institutionalized in the federal government and in federal legislation. For example, the EPA is required to issue a report every five years on the benefits and costs of regulations promulgated by the agency. The U.S. Geological Survey (USGS) issues periodic reports from USGS stream monitoring networks showing the rate of progress in improving water quality. The EPA also publishes periodic reports on levels of ambient air quality and estimated pollutant emissions into air and water. Ex post analysis of social policy is also quite far advanced. For example, organizations such as the Manpower Development Commission conduct sophisticated experiments on the behavioral effect of cash incentives or work requirements for welfare recipients.

All these studies, however, are incomplete in crucial ways. They focus on the effectiveness of the regulation, which for environmental regulations means the measurement of pollution reduction, reduction in measured risk, and in some cases on improvements in environmental quality. It is much less common to find ex post studies examining other aspects of regulation, in particular studies that also examine the actual costs incurred and compare them to the estimated costs. To be sure, ex post estimates of regulatory costs can be found, but they are difficult to tie to particular regulations (as is often the case with regulatory benefits, for that matter). For example, from 1982 until 1994 and again beginning in 2000 the U.S. Census Bureau

administered the Pollution Abatement and Control Expenditure Survey (PACE) to a random sample of establishments, inquiring about expenditures on air and water pollution abatement and solid waste reduction. Unfortunately, the survey instrument makes it impossible to associate expenditures with particular regulations.

Several years ago the authors of this report were working together on a project to study the ability of regulators to estimate the cost of regulation by comparing the cost estimates produced during the rulemaking process with the actual costs of the regulation (Harrington et al. 2000). We were surprised that despite extensive efforts in which we contacted a wide range of experts around the world, in the end we could find only a handful of ex ante, ex post pairs of studies that considered both effectiveness and cost of regulations.

At first blush, it seems odd that ex post studies of regulatory effectiveness are common, while cost studies are not. In principle, both the benefits (or effects) and the costs of regulation are unobservable, because although the world with the regulation is observed, the counterfactual is not and must be modeled. If this were the only factor at work, it would suggest that ex post studies of effectiveness and cost ought to be rare or common, but not that studies of one should be rare and of the other common. Perhaps part of the explanation is that government authorities, who produce most of the estimates of regulatory performance, have more incentive to estimate the effects of regulation than the costs.

It is also quite likely that ex post estimation of costs is considerably more difficult than ex post estimation of pollution abatement, environmental improvement, or other measures of regulatory performance (and, of course, more difficult than ex ante cost estimation used in RIAs). Instead of the "model plant" or hypothetical cost estimates generally used in ex ante studies, an ex post cost study requires the actual expenditures of the plants subject to the regulation.[6] This information is often proprietary and not available to the analyst and, even when

[6] It also requires the analyst to be able to distinguish between an expenditure and a cost. Sometimes a cost is not an expenditure, such as when regulated firms use land or other resources already in their possession to comply with the regulation. And sometimes an expenditure is not a cost, for example, transfer payments.

available, it is often difficult to interpret. Abatement costs are notoriously subject to joint cost allocation problems, because plant activities to comply with one regulation can increase (or decrease) plant output or make it more (or less) difficult to comply with other regulations. For example, analysts are still arguing about the costs incurred by the automobile industry in complying with the 1970 Clean Air Act. To what extent can the cost of electronic fuel injection, which was disseminated from a small group of high-performance vehicles to the entire industry during the 1980s, be attributed to the exigencies of the pollution abatement regulations? If there had been no such regulations, would the corporate fuel economy (CAFE) regulation, which was also enacted about this time, have diffused this technology through the industry as rapidly? In the absence of both regulations, would competitive pressures have done the job?

Some regulations also have costs that are difficult to estimate because they are not readily observable in market transactions. For example, OSHA's cotton dust regulation in the 1970s considered, as an alternative to stringent limits on cotton fibers within textile plants, less stringent limits accompanied by mandatory use of respirators by some plant workers. The cost of this alternative would have to include a measure of workers' discomfort and inconvenience associated with respirator use, unless it was fully compensated by wage increases (in which case the wage increases would measure the cost), as well as increased risk resulting from worker noncompliance. Similar considerations have arisen with asbestos and pesticide regulations.

Examination of this relatively meager collection of cases produced some surprising conclusions about the RIA. We were expecting to support one of the two stories frequently told about cost estimates in ex ante studies. On the one hand, political conservatives and other foes of social regulation argue that RIAs routinely underestimate the cost of regulatory statutes and, to a lesser extent, individual regulations. On the other hand, advocates counter that costs of individual regulations are nearly always overestimated. While we found the latter to be true insofar as it concerned the total costs, we also found that the effects of the regulation—the emission or risk reductions—were overestimated as well. To the extent that unit costs could be calculated, we found that overall there was no bias toward overestimation or underestimation. The main reason the costs and benefits were overestimated was a failure to implement the regulation fully. We also found that there was one category of regulations where unit costs were almost always

overestimated in the RIA—economic incentive (EI) policies. In these cases, unit costs were overestimated because the environmental improvement was underestimated. This was something of a surprise, inasmuch as the main criticism of EI from the early ’70s (mainly of price instruments such as effluent fees) was that they could not be relied upon to achieve the desired environmental results.

Another conclusion of our research was that there were systematic differences between government agencies in the accuracy of the cost estimates. For regulations promulgated by the EPA, we found no bias in regulatory estimates. For regulations issued by the U.S. Occupational Safety and Health Administration, however, we found that RIAs usually overestimated costs substantially. The result for OSHA has been supported by a survey of recent RIAs (Seong and Mendeloff 2003), which shows that the estimated benefits of recent workplace safety regulations are seriously overestimated, possibly because of incomplete implementation. Seong and Mendeloff also observe that OSHA RIAs are required to assume complete implementation, perhaps in part accounting for the overestimates.

Comparisons of ex post outcomes to ex ante predictions offer an essential element of “ground-truthing” to the practice of regulatory evaluation. The comparison of regulatory outcomes to the predictions made in the RIA is a valuable test of both the RIA and the regulation itself. A well-done ex post analysis, moreover, is not limited simply to an examination of the effectiveness and cost of the regulations, but can test other assertions made during the regulatory process. Investigation along these dimensions can inform future regulations and RIAs. The nature of these additional claims depends on the situation. Some examples:

Did the regulation lead to job losses or plant closures? In Sweden, a ban on the use of chlorinated solvents prompted the industry to threaten plant closures and relocation to other more hospitable countries (presumably located in the third world). An ex post study by Thomas Sterner (2003) has shown that virtually no plants shut down. On the other hand, the ban was not entirely successful as a number of plants, producing a third of all output, were granted exemptions to continue production (Sterner 2003).

Is it difficult to implement? Consider the U.S. Effluent Guidelines, which were very detailed process- and industry-specific regulations for point-source industrial wastewater dischargers. During the first round of standard setting (about 1974–1981) nearly all of the promulgated regulations were challenged in court, resulting in substantial delay and in many cases remand of the regulations to the EPA (Harrington 2003). Of course, not much of the litigation was attributable to the regulatory documentation (most of which was prepared before the Reagan executive order in any case). Rather, it is best seen as a test of EPA's political will and power to implement its regulations.

Has new technology been developed to comply with the regulation? The classic case of new technology in the United States is the vinyl chloride case, where evidence of a strong link between exposure and liver cancer caused OSHA to promulgate, despite industry's claims of technical infeasibility, very stringent worker exposure regulations. Within a year of the issuance of the final rule, a substitute had been developed at a tiny fraction of the predicted cost of the regulation. On the other hand, exposure to coke-oven emissions was regulated in a similar fashion, but in this case the needed innovations did not emerge, and the industry had to be granted regulatory relief. These cases and others are discussed in a retrospective examination of OSHA regulation conducted in 1995 by the U.S. Office of Technology Assessment (U.S. OTA 1995).

Like the content tests, ex post analysis of regulatory outcomes can be very informative, but doesn't tell us everything we'd like to know. In particular it doesn't give any information on the effect of the RIA on the outcome of the regulatory process itself.

4.3 Function Tests

The idea of evaluating RIAs presupposes that RIAs make a difference—namely, that the outcome of regulatory processes is in some way different from what it would have been in the absence of the RIA. The counterfactual is difficult to conceptualize because, even without the current RIA requirement, it is nonetheless likely that some analysis of the effects of regulation would have been done. In any case, there has been remarkably little analysis of the effect of RIA characteristics on regulatory outcomes.

To a certain extent, the content tests discussed earlier can tell us something about the uses of the RIA in decisionmaking. A particularly important instance is the RIA's treatment of alternatives. As noted by Hahn, examination of alternatives to the chosen regulation is more the exception than the rule in recent RIAs. Absence of alternatives suggests, more than anything else, that the RIA did not, nor was expected to, play a significant role in the design of the proposed regulation. However, the presence of alternatives does not indicate whether these alternatives are merely straw men in the regulatory process. Also, even without considering alternatives, the regulation may have served other purposes, such as analyzing whether to go forward with the regulation at all.

One relevant though somewhat dated study of the impact of regulatory documents is Magat et al. (1986), which examined the effect of the quality of regulatory support documents generally on the outcomes of the Effluent Guidelines regulatory process during the 1970s. Two documents were examined: the "development document" and the "economic analysis." The former gave the technical information on the industry, its technological options for wastewater treatment and the one identified as the basis of the regulation, while the latter assessed the effect of the proposed regulation on costs, prices, profits, plant closures, and unemployment. The authors used a fairly elementary definition of document quality—namely, were the numbers consistent? Did the report leave a trail that a careful reader could follow to connect the input data with the outputs, i.e., the estimated effects?

What they found was that document quality, defined in this simple way, made a substantial difference in how much the agency changed the regulation during the rulemaking process. The more coherent the document, the more the effluent standards changed. For example, when the development document failed their quality test, the promulgated best practicable technology (BPT) standards were made 33% less stringent for biochemical oxygen demand (BOD) and 44% less stringent for total suspended solids (TSS) than the proposed standards. We don't mean to imply that a more stringent regulation is "better," only that document quality can affect the regulatory outcome. It is possible that poor documentation simply indicated an industry that was both difficult to regulate and difficult to characterize in a technical report. Though possibly

affected by spurious correlation, we know of no other study that provides statistical evidence that the quality of regulatory support documents makes a difference to the outcome of the regulation.

There is, however, one recent econometric study that examines the effect of regulatory review more generally on the rulemaking process. Farrow (2000) uses multivariate regression methods to examine a database of 69 regulations proposed by several U.S. agencies and reviewed by the OMB, of which seven were rejected (i.e., sent back to the agency for further consideration). Eventually all seven were dropped. This database, first developed by John Morrall of OMB (Morrall 1986) and updated and refined by Farrow and other researchers, consists of health and safety regulations for which researchers were able to calculate the implicit value of saving a life. Cost per life saved became the cost-effectiveness standard by which these regulations were judged.

The purpose of Farrow's study is to examine several potential effects of regulatory review, including whether rules with poor cost-effectiveness are more likely to be rejected and whether the cost-effectiveness of rules improved during the regulatory review process. The results suggested that the regulatory review process had at best a slight effect on cost-effectiveness. Rejected rules were only slightly less cost-effective than rules that were adopted, and the cost effectiveness of rules did not improve during the process. However, the small sample size suggests caution in interpreting the results. With only seven failures, their characteristics could easily be unduly influenced by one observation. In addition, many of the rules in the database date from the early 1980s, when the regulatory review process at OMB was very new and possibly much different from what it is today. A third qualification to this study is that it cannot take account of the potential effects of the existence of the review process on the proposed rule and the preparation of the RIA. If regulators within an agency know its proposed rules will later be scrutinized and possibly returned to them if they are deemed not cost-effective, that knowledge is likely to affect their behavior. Thus, although this study is creative and its methodology is interesting and potentially useful, with the data that are currently available, it is not conclusive.

In addition, there is a body of case-study evidence that we can draw upon to examine the effects of regulation. Among studies we are aware of, the most relevant is a set of studies of

RIAs conducted by current or former EPA economists (Morgenstern 1997). The case studies in this volume are unusually complete analyses of government regulations, examining not only the preparation of the RIA and, to a limited extent, the comparison of ex post results with ex ante expectations, but also how the RIA is used in the rulemaking process.

In looking at these cases, two qualifications should be kept in mind. First, this is a highly nonrandom sample. The regulations examined tend to be highly visible cases—large in both expected costs and benefits (e.g., lead in gasoline) or having direct effects on household behavior (such as the Enhanced Inspection and Maintenance rule for light-duty vehicles). For those reasons, these RIAs tended to have large budgets and, with one or two exceptions, were, like the retrospective studies of them, reasonably complete and carefully done. Second, the authors of these case studies were in most cases closely connected to the regulatory process they were writing about, either as EPA officials or as consultants or other close observers outside the agency. The advantage provided by this set of authors is their intimate familiarity with the regulatory histories. At the same time, the authors' close involvement in the rulemaking processes might lead one to question their detachment. Attempts were made to answer this criticism by subjecting each case study to peer review by outsiders almost as knowledgeable and without a connection to the issue.

One of the clearest lessons of these case studies is the critical importance of timing to the usefulness of RIAs. Several case-study authors mentioned the fact that many RIAs are not initiated until after the regulatory process is well under way, often after the preferred alternative has been selected (Morgenstern and Landy 1997). In this situation, the usefulness of the RIA is obviously undermined. Worse, it puts pressure on the analyst not to deliver bad news about benefits and costs, especially about the preferred alternative, leading to cynicism about the role of RIAs in the regulatory process. Most analysts believe the RIA should begin before the regulatory process begins, in order to develop information useful in decisionmaking.

Even in cases where the RIA got off to a late start, however, the authors of all 12 of these case studies believe *their* RIA did have an effect, although often it was not as influential as it could have been. According to the authors, all the RIAs led to improvements that decreased costs, and five of the 12 introduced changes that increased benefits (Morgenstern and Landy

1997, Table 1), although the authors conceded that, with multiple influences on the process, it is difficult to ascribe with certainty any specific influences to the RIA.

In addition, the authors credited the RIAs with other accomplishments. In the organic chemicals effluent guidelines, the RIA identified cross-media pollution (e.g., volatilizing organic chemicals into the air rather than discharging them into the water) as an important issue; it had been overlooked in other analyses up to that point (Caulkins and Sessions 1997). Other studies identified and quantified new benefits. The RIA for the leaded gasoline rule found, for example, that the monetized benefits of reduced blood pressure dwarfed other benefits of reduced lead exposure and led to a tightening of the rule (Nichols 1997). The innovative market studies done in the asbestos study found that for many products the cost of a ban would be modest because of the ready availability of substitutes (Augustyniak 1997).

Some RIAs also promoted innovative regulatory alternatives, at least for their time. The leaded gasoline rule examined the use of refinery averaging and banking, both of which became cornerstones of the policy governing the lead phasedown between 1984 and 1988. The RIA on chlorofluorocarbon (CFC) regulations also examined a banking and trading alternative that was adopted in the final regulation (1991). Trading was also examined in the RIA for asbestos, but was ultimately discarded because of agency inexperience and serious practical difficulties (e.g., asbestos embedded in imported products).

It goes without saying that quantifying the benefits of RIAs would be very difficult, not least because it is not even clear what the effect of the RIA is. The RIA can also impose costs, some of which we can all agree with in principle, although we may disagree strongly in practice (such as the effect of the RIA on the time required to push a regulation through the process).

5. Some Suggestions for Future Inquiry

Regulatory processes need timely, high-quality economic and technical analysis that is also capable of speaking to both general and technical policy audiences to assist in decisionmaking and to assure the integrity of the regulatory process. But how do we know when RIAs actually achieve these goals? We have discussed three different vantage points from which RIAs can be

evaluated: their content, their outputs, and their function. However, we do not think it is possible to "choose" one way to evaluate RIAs. These approaches are not substitutes, but complements.

A medical analogy might be helpful. We can think of intensive content tests of RIAs as a routine checkup. It can take place before the regulatory process is complete and the regulation is implemented and therefore can be used to make improvements to the RIA and to the regulation in question. The approach could perhaps be enhanced by Morgenstern and Landy's suggestion to bring in outside review both by the public and by experts at the earliest stages of the rulemaking process, continuing through until the rule is promulgated.

It is a little more difficult to put the extensive content tests such as those by Hahn et al. in this framework. However, a slight change in research design might make the medical analogy work better and make the research more relevant to the present purposes as well. A simple modification to Hahn's methodology would be to link his descriptive data—the content of individual RIAs—to outcomes, both of the regulatory process and the results on the ground. With this change, the closest medical analogue would be that of retrospective epidemiology—that is, having observed a diversity of outcomes among a set of individuals, can we link those outcomes to characteristics of those individuals or to events that happened at an earlier time?

In contrast, the case studies examined in Morgenstern (1997) and Delphi Group (2000) are autopsies, in that no improvements to the RIA under examination would be of use to that RIA or rulemaking process. By examining the successes and failures of the past, their principal use is to help find problems in the regulatory process, improve future RIAs, and, most importantly, improve future regulations.

To that end, we think the most important and most difficult item on the agenda is to develop a procedure for the routine completion of ex post analyses of regulatory outcomes. As noted above, comprehensive ex post analyses that examine physical outcomes and costs are very rare, and yet one of the research needs most often cited in policy-analytic circles is the need for more ex post analysis. If a type of research is both rare and highly desired, then most likely it is quite difficult to do. So, the concluding question before us is, what are the barriers to complete ex post analysis, and what can be done about them?

One barrier is institutional: the need to find a home for audits of regulatory performance, cost, and other implications of regulation. "Line" agencies—the agencies that prepare the rules in the first place—appear to be reluctant to undertake such studies, at least in the United States. They rarely have the budget to do it, and many in the agency would consider it outside the scope of their mission. Most regulators faced with a choice between funding a study of the performance of an existing regulation and a study of potential need for a new regulation would have an easy choice. Also, some may question whether the promulgating agency would have conflicts that would get in the way of a balanced assessment.

Another barrier is data. Those who have tried to do ex post studies of regulatory outcomes quickly run into numerous data problems. Some of these, relating to the definition of costs and the difficulties of allocating joint costs, were touched on previously. In addition, there are often problems just finding out what the outcomes were. This may be a particular problem in a federal system such as that of the United States, where data on regulatory outcomes often exist, but are stored by state rather than federal agencies and therefore difficult to assemble. Even when centralized data sets exist, often they are poorly audited or collected in a way that does not easily permit scientific analysis. For example, the EPA and especially state governments in the United States have at times in the past set protocols for collecting ambient environmental data or pollutant discharge data for enforcement purposes in order to build cases against offenders, a use that is often incompatible with scientific analysis. Furthermore, regulatory analysis is "with and without" analysis, not "before and after" analysis, requiring not only what the world was like before the regulation was imposed, but what would have happened it its absence. This "baseline" problem is more than a data problem; it is also a modeling problem. The world will either be observed with the regulation or without it; one cannot rewind the tape of life and play it again.

To a considerable degree, these well-known problems of policy analysis can be reduced by the RIA itself. In particular, a well-done RIA will have data on the preregulatory environment and models establishing the baseline. Beyond that, the analysts preparing the RIA are in the best position of anyone to determine the time that must elapse before a useful ex post analysis can be performed, as well as the data and models that may be needed to complete it.

Perhaps, then, it would be a useful addition to the regulatory process to consider the design of a potential ex post analysis: when it should be done, how it could be done, and what it would cost. Sometimes the data required may already be collected by one or more agencies; other times new data collection efforts will be needed. With this information in hand, policymakers can decide at the time the regulation is issued whether to invest in that data and model development that would permit an ex post analysis. For a relatively modest investment in data development, the cost of a subsequent ex post analysis could be substantially reduced and its quality greatly improved. In short, the best time to begin an ex post evaluation of a regulation is before the regulation becomes effective.

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Appendix
Regulatory Impact Analysis in the United States

Since its inception in the 1970s, RIA has grown enormously in scope and sophistication, and no institution has contributed more to this trend than the executive branch of the U.S. government. The growth of RIA paralleled the substantial growth of "social" regulation that began in the United States in the 1970s.[7] Social regulation was concerned with workplace safety and health, environmental quality, exposure to hazardous chemicals, unsafe consumer products, and like concerns. Ironically, as social regulation waxed, economic regulation waned, with deregulation of airlines, trucking, railroads, banking, and—currently in progress—electricity.

Greater scrutiny of regulations would probably had occurred in any case, but its development was greatly enhanced by the long period of "split government" in the United States, in which Congress is in the hands of one party and the presidency belongs to the other. Between 1969 and 2001, power was split except for four years of the Carter administration (1977–1981) and the first two years of the Clinton administration (1991–1993).

Split government meant a wider-than-normal separation between the executive and legislative branches of the federal government at a time when Congress was beginning to take a more activist approach to environmental, health, and safety regulation. The Democratic Congress would propose sweeping legislation directing executive agencies such as the Environmental Protection Agency (EPA) or Occupational Safety and Health Administration (OSHA) to implement detailed regulations, in some cases by industrial sector and in others by product. These agencies, in effect, had to serve two masters: the Congress and the President, and were

[7] Earlier, federal regulation tended to be economic, concerned with such matters as regulating the prices of goods or services produced by industries thought to be natural monopolies and whose activities crossed state lines. These included railroads, airlines, and transmission of natural gas and electricity. Federal regulation also restricted activities of banks and sought to prevent excessive concentrations of market power. See Portney (1990, chapter 1) for a discussion of differences between "old" regulatory agencies such as the now-defunct Interstate Commerce Commission and "new" agencies such as the EPA.

further under the watchful eye of advocacy groups supporting or opposing the new legislation and hoping to influence its implementation.

Because presidents didn't have complete control over the agendas of executive agencies, since the 1970s they have sought to put the brakes on this regulatory process by requiring a review by economists of the costs, benefits, and effects of all regulations. The key event was Executive Order 12291, issued on February 17, 1981, shortly after President Reagan took office, announcing new rules governing the issuance of regulations by federal agencies. E.O. 12291 introduced two revolutionary innovations into federal rulemaking. First, it required federal agencies to produce, before any "major" proposed regulation could appear in the Federal Register,[8] an assessment of the benefits and costs of the proposal and alternatives to it. Before the Reagan administration, economic assessment of regulations was concerned not with benefits and costs, but with "economic impacts," which included the effect of the regulation on the inflation, employment, and the profits of affected industries.[9] In addition, E.O. 12291 required centralized review of regulations and the accompanying RIA by an oversight group, the Office of Information and Regulatory Affairs (OIRA), housed in the Office of Management and Budget.

The regulatory review process in the United States is now governed by E.O. 12866, issued by Bill Clinton on September 30, 1993.[10] The main changes to the Reagan procedure were to increase the public's accessibility to the process, to add requirements to examine distributional consequences of rules, and to require only that the benefits of proposed regulations have to "justify" the costs, not "outweigh" the costs as it had been in E.O. 12291. Presumably, this last change in particular would make it easier to proceed with the regulation even if measured benefits do not exceed measured costs.

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[8] "Major" regulations are those with an anticipated annual cost in excess of $100 million or those that may have adverse environmental or distributional consequences.

[9] See Magat et al. (1986) for a discussion of the preparation and use of such studies in the Effluent Guidelines rulemaking process.

[10] President Bush made some minor procedural amendments in E.O. 13258, but the major elements were unchanged.

For the most part, however, Clinton retained and streamlined the procedures put in place by Reagan. In other words, recent presidents of both parties support the regulatory review requirements, including the RIA. It has ceased to be the partisan political issue it once was.