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How Well Does the U.S. Government Do Cost-Benefit Analysis?

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Executive Summary

To make prudent recommendations for improving the use of cost-benefit analysis in policy settings, some measures of how well it is actually done are essential. This paper develops new insights on the potential usefulness of government cost-benefit analysis by examining how it is actually performed in the U.S.

We assess the quality of a particularly rich sample of cost-benefit analyses of federal regulations. The data set we use for assessing the quality of regulatory analysis is the largest assembled to date for this purpose. The seventy-four analyses we examine span the Reagan, the first Bush and the Clinton administrations. The paper is the first to assess systematically how government cost-benefit analysis has changed over time.

There are three key findings. First, a significant percentage of the analyses in all three administrations do not provide some very basic economic information, such as information on net benefits and policy alternatives. For example, over 70% of the analyses in the sample failed to provide any quantitative information on net benefits. Second, there is no clear trend in the quality of cost-benefit analysis across administrations. Third, there is a great deal of variation in the quality of individual cost-benefit analyses.

How Well Does the U.S. Government Do Cost-Benefit Analysis?

Robert W. Hahn and Patrick M. Dudley

I. Introduction

Over the past several decades, there have been numerous critiques of the application of economic approaches to problems in public policy. Several books and articles have been written that criticize cost-benefit analysis and economic policy analysis more broadly (Ackerman and Heinzerling 2002). There have also been a number of defenses of economic approaches to analyzing important public policy issues. For example, Justice Breyer argues that government needs to set regulatory priorities differently so that more lives can be saved with a given level of expenditures (Breyer 1993). Sunstein (2002) takes a different approach, but also supports the expanded use of cost-benefit analysis.

The debate over the use of economic analysis as a tool in regulatory decision making is more than academic. Countries and states throughout the world are requiring extensive use of cost-benefit analysis and related tools as a way of informing key regulatory decisions and reforming the regulatory process. In the U.S., for example, the Office of Management and Budget (OMB)—the agency charged with regulatory oversight—is using cost-benefit analysis to both improve regulatory proposals and stimulate the implementation of new measures where the benefits exceed the costs (OMB 2002).

The use of cost-benefit analysis has been particularly controversial in the area of environmental, health and safety regulation (Adler and Posner 2000). According to government estimates, the costs associated with such regulation are substantial—on the order of \$200 billion (in 1996 dollars) annually (OMB 2001). The benefits, which are harder to pin down, may be even larger, although the net benefits (or costs) of individual regulations can vary significantly (OMB 2001; Hahn 2000; Freeman 2002; Morrall 2003). Thus, making even relatively modest changes in the regulatory apparatus could have significant implications for the public's health and welfare.

Economists generally believe that cost-benefit analysis is a useful tool for helping decision makers better assess the impact of policies (Lave 1982; Viscusi 1996; Portney 1990; Arrow, et al. 1996). Cost-benefit analysis can help decision makers select policies with positive net social benefits; identify the likely winners and losers from a policy; evaluate the impact of

uncertainty on the net benefits of different policies; and assess the potential value of new information (Stokey and Zeckhauser 1978; Raiffa 1970).

Cost-benefit analysis can also help identify key deficiencies in our understanding of a particular policy issue, and show how sensitive the results are to different assumptions (Viscusi and Hamilton 1999). For example, an analyst may be able to quantify the likely economic costs of requiring passengers to have their bags screened at airports, but may not be able to assess the likely benefits of such a policy. An analysis of an environmental regulation may highlight that we do not really understand the pathway by which humans are exposed. In short, cost-benefit analysis can provide a useful framework for understanding the implications of different policy choices and whether a proposed regulation offers social net benefits (Sunstein 2002).

Scholars differ over the extent to which cost-benefit analysis should be used as a tool for making policy choices. Some take the view that before a government policy is implemented, there needs to be reasonable evidence that the benefits of that policy are likely to exceed the costs, and that the particular option chosen offers the highest expected net benefits (Crandall, et al. 1997). Others believe that the decision maker should have more discretion, but that cost-benefit analysis can provide a useful input into policy-making (Arrow, et al. 1996; Sunstein 2002). Still others believe that cost-benefit analysis is not terribly useful in a number of settings because of practical or theoretical problems (Chichilnisky 1997; Kelman 1981).

Economics, as a profession, should take special interest in cost-benefit analysis. Outside of the Federal Reserve, this may be the area of public policy where economic ideas are used most often. Knowing the strengths and weaknesses of these analyses will help economists both inside and outside the government understand how cost-benefit analysis can be more effectively used to improve public policy.

In order to make prudent recommendations for improving the use of cost-benefit analysis in policy settings, we need to have some measures of how well such analyses are actually done, since the utility of a particular analysis depends, in large part, on its quality. Of course, even a reasonably good analysis does not assure that the ensuing decision will be sensible. But if the analysis is poor, it is certainly more likely that decision makers will make poor decisions. So, for example, a poor analysis of a water quality regulation could lead to the selection of a policy that results in lower levels of water quality than might be achieved with a policy that could have been selected with a better analysis.

The purpose of this paper is to examine how cost-benefit analysis is actually performed by U.S. government agencies. To this end, we assess the quality of a sample of 74 cost-benefit analyses of federal environmental regulations from the Environmental Protection Agency (EPA) that span the Reagan, the first Bush and the Clinton administrations. The paper is the first to assess systematically how government cost-benefit analysis has changed over time and uses the largest data set assembled to date.¹

Our analysis is possible because since 1981, the U.S. government has required that a cost-benefit analysis be conducted for all economically significant federal regulations—regulations that frequently cost billions of dollars annually. Even though they are *ex ante* analyses, these regulatory impact analyses (RIAs) represent the most comprehensive set of data about the consequences of regulation in the U.S.

The paper has three key findings related to the actual practice of cost-benefit analysis. First, a significant percentage of the analyses done by the EPA do not report some very basic economic information. Second, there is no clear trend in the quality of cost-benefit analysis across administrations. Third, there is a great deal of variation in the quality of individual cost-benefit analyses.

The remainder of this paper is organized as follows. Section 2 provides some institutional and historical background on the use of cost-benefit analysis in regulatory decision making in the U.S. Section 3 describes the main approaches for measuring the quality of regulatory analyses and presents the analytical approach used in this study. Section 4 describes the results of our analysis. Section 5 discusses implications of the results and offers some policy recommendations. Section 6 concludes.

II. Government Requirements for Cost-Benefit Analysis of Regulation

Federal regulation has grown dramatically in the last fifty years. Although regulations resulting from legislative mandates often have little direct fiscal impact, they pose real costs to consumers and businesses. Initially, however, the economic impacts of federal regulation received much less scrutiny than discretionary programs in the budget, even though such regulations have important implications for economic efficiency. Early efforts to rationalize the

¹ Hahn et al. (2000), GAO (1997), GAO (1998), Smith (1984) and Morgenstern (1997), among others, evaluate a significant number of RIAs, but none focuses on whether there is a time trend.

regulatory process can be traced to Presidents Nixon, Ford and Carter, but much more significant action started with President Reagan (Weidenbaum 1997).

Over the last two decades, both Congress and the Executive Branch have initiated regulatory reforms in order to better assess the impacts of regulation on economic activity and to encourage the development of more effective and efficient regulations (Sunstein 2002; Hahn 2000; Renda 2006). For example, Presidents Reagan, Bush, and Clinton directed all agencies to perform economic analyses of major regulations that show whether a regulation's benefits were likely to exceed its costs and whether alternatives to that regulation would be more effective or less costly. Each president also attempted to increase agency accountability for decisions by requiring that OMB review all major regulations. More recently, Congress has also embraced regulatory reform. For example, Congress inserted analytical requirements and accountability mechanisms, including regulatory oversight, sunset provisions, regulatory budgets, and peer review, into laws such as the Safe Drinking Water Act Amendments of 1996, the Small Business Enforcement and Fairness Act of 1996, and the Unfunded Mandates Reform Act of 1995. In addition, Congress has passed laws that require OMB to produce regular reports on the costs and benefits of federal regulation (e.g., OMB 2004; OMB 2005).

The most prominent and far-reaching of these regulatory reform efforts are President Reagan's Executive Order 12291 and President Clinton's Executive Order 12866.² Both of these executive orders require agencies to prepare an RIA for all major federal regulations.

Thus, agencies have been preparing RIAs for over twenty-five years. The basic requirements placed on agencies have remained constant, even though some of the details have changed. Both Executive Order 12291 and 12866 require agencies to consider all significant costs and benefits, including those that cannot be quantified. Furthermore, agencies must consider all alternatives and choose the one that maximizes net benefits or minimizes net costs.³ Both executive orders place OMB in charge of overseeing the regulatory process. However, Clinton's Executive Order 12866 places more emphasis on distributional concerns and public transparency of the regulatory process. Executive Order 12866 also requires agencies to show that the benefits "justify" the costs, in contrast to Reagan's Executive Order 12291, which

² President George W. Bush recently amended Executive Order 12866. The basic thrust of the new order is the same with regard to economic analysis of regulations. But the new order also requires more careful scrutiny of regulatory guidance from agencies.

³ This requirement does not apply if the law forbids it, as is the case with setting national ambient air quality standards. Executive Order 12291, however, specifically calls for the analysis of alternative approaches that could result in higher net benefits, along with an explanation of the legal reasons why the alternatives could not be adopted.

requires that the benefits “outweigh” the costs. Both allow for analyzing some effects in qualitative terms only. Reagan’s Executive Order 12291 acknowledges that some effects “cannot be quantified in monetary terms,” while Clinton’s Executive Order 12866 specifically calls for quantifiable measures “to the fullest extent that these can be usefully estimated.”

OMB has issued guidelines and memos instructing agencies on how to comply with the relevant executive orders (OMB Guidelines 1996). The EPA also issued its own set of guidelines, detailing how RIAs should comply with the executive orders (EPA 1983). The basic instructions, such as quantifying as many costs and benefits as possible and evaluating alternatives, have remained constant over the past twenty-five years. These are the elements of the RIA that we examine below.

III. Assessing the “Quality” of Regulatory Analyses

The quality of a cost-benefit analysis is intrinsically hard to measure. There are essentially three approaches for measuring the quality of regulatory analyses. One is to have experts carefully examine the details of a particular cost-benefit analysis or group of analyses, such as key assumptions and results (Morgenstern, ed. 1997; Smith, ed. 1984; Sunstein 2002; Lutter and Gruenspecht 2001; White 1981). The main advantage of such a case-study approach is that detailed analysis of individual cases can highlight the strengths and weaknesses of the data, assumptions, and underlying models. A major weakness of this approach is that the analytical methods are not easily generalized and the results are not easily replicated. Furthermore, reasonable people may disagree about the relative quality of analyses because of the highly subjective nature of the case study approach.

The second approach uses estimates of a key parameter, such as net benefits or cost effectiveness, from studies done before and after the implementation of a policy (Harrington, et al. 2000; OMB 2005). The idea is that the estimate done after a study provides a better measure of the actual impact of a policy. This approach poses a number of challenges from the standpoint of measuring quality. First, it depends on the state of information available when the studies are done. Second, analyses done before and after the fact could differ for a number of reasons related to methodology and assumptions, and this needs to be taken into account. Third, there have been

relatively few studies of this kind because accurately estimating the *ex post* effects of a regulation can be difficult and costly, and there is little political payoff to having such estimates.⁴

A third method is to score a large number of cost-benefit analyses according to whether they meet a number of basic, objective criteria, such as whether some costs and benefits were monetized, whether costs and benefits were discounted, and whether alternatives were considered (Hahn et al. 2000; GAO 1997; GAO 1998).

A great advantage of the scorecard method is that it requires no detailed knowledge of the assumptions and calculations underlying a particular analysis, and does not require the researchers to judge whether the estimates are correct or based on sound science, only whether or not they were presented in an RIA. The definition of a good RIA is very specific—it follows the basic requirements set forth in the executive orders and OMB guidelines. In this sense, the scorecard is objective, and other researchers should be able to reproduce the results.

A potential disadvantage to this focus on reporting, rather than on the underlying assumptions or methods, is that an RIA could receive a high score and still be poorly done. In the extreme, an RIA could receive a perfect score if all of the appropriate estimates are included, but still be of low quality if all of the estimates are wrong. In other words, the scorecard approach precludes critical evaluation of the agency estimates, which may be biased or compromised by analytical flaws. However, since many of the questions on the scorecard are quite basic, an RIA with a low score is unlikely to be of high quality.

Furthermore, the scorecard does not measure the impacts that RIAs may have on the process of regulation itself, such as increasing transparency, encouraging debate, or changing policy. Such benefits are potentially significant, but they can not be captured by the scorecard used in this study.

A. Approach of the Current Study

This study uses the scorecard method described above to identify common strengths and weaknesses among a relatively large sample of RIAs. We assess the quality of seventy-four agency RIAs by testing how well they meet the government's own standards for economic analysis, as described in Executive Orders 12291 and 12866, and the OMB guidelines (Reagan 1981; Clinton 1993; OMB 1996).⁵

⁴ Politicians are typically not interested in supporting analyses of regulations and programs because they are costly and have the potential to put initiatives they support in a bad light.

⁵ A list of the 74 RIAs studied is available as supplementary material linked to the online manuscript.

Executive Order 12866 states, for example, that agencies shall provide “an assessment, including the underlying analysis,” of benefits and costs expected from a regulation and, “to the fullest extent,” provide a quantification of those benefits and costs. The OMB guidelines further direct agencies to express benefits and costs in monetary terms “to the fullest extent possible.” In addition, they identify and discuss principles for placing an explicit value on benefits that are difficult to monetize, such as environmental amenities (OMB 1996). Executive Order 12866 also requires that agencies specifically assess the effects of regulations on State, local, and tribal governments. In addition, Executive Order 12866 states that “agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating” (Clinton 1993, § 1(a)). The OMB guidelines further provide agencies with a recommended approach for evaluating alternatives, such as urging agencies to define carefully the proper baseline, to discuss uncertainty and bias in estimates, and to carefully describe key assumptions used in developing estimates of benefits and costs (OMB 1996). The EPA guidelines even list the types of alternatives that may be considered when evaluating a proposal. Finally, according to Executive Order 12866, the RIA must provide sufficient information to demonstrate that the agency is selecting the regulatory approach that maximizes net benefits, unless the approach is prohibited by statute.

Based on the executive orders and OMB guidelines, the authors developed a “regulatory scorecard” consisting of a series of yes/no questions, such as: Did the RIA state that costs exist? Did the RIA monetize at least some benefits? Did the RIA calculate a measure of cost effectiveness? Each item listed on the scorecard represents an essential element of a good economic analysis. The questions on the scorecard are similar to those used in previous research (Hahn et al. 2000) and are available as supplementary material linked to the online manuscript.

B. The Sample

The sample used in this study consists of a total of seventy-four RIAs—twenty-seven from the Reagan administration, twenty-four from the George H. W. Bush administration, and twenty-three from the Clinton administration. The RIAs were published from 1982 to 1999. All of the RIAs were from the EPA. EPA was selected because it accounts for a majority of all available regulatory analyses and more than half of the total costs of regulation (Hahn 2000; OMB 2001). We chose to focus on a single agency to minimize variations in quality across agencies. In addition, many agencies have not written enough RIAs to form a significant sample

for each administration. While there has been some analyses comparing RIAs across agencies, they have suffered from small sample sizes (GAO 1998; Hahn et al. 2000).

The sample includes as many available RIAs as could be found from 1982 to 1992 and all of the Clinton-era EPA rules included in Hahn et al. (2000), which covered all rules published in the *Federal Register* between April 1996 and July 1999. With a few exceptions, such as rules passed under emergency circumstances, agencies produce RIAs for all major rules. Although there is some overlap, this sample is different from Hahn et al. (2000), which examined multiple agencies during one administration. This study examines one agency across multiple administrations. RIAs were obtained through web searches, through searches of the agency's dockets, and through officials at OMB, EPA and the General Accounting Office.

Our search was thorough and our sample is larger than any previous efforts. We acknowledge, however, that we may be missing some RIAs written during the Reagan and Bush administrations, because until Congress required OMB to issue annual reports on regulation in the mid-1990s, there was no official public record of which regulations had been analyzed under the executive orders. Nor were agencies required to keep copies of old RIAs. The most exhaustive public record of environmental RIAs we could find was kept by the National Center for Environmental Economics, a division of the EPA. We thoroughly checked this library for RIAs both online and at EPA headquarters.⁶

Because more environmental rules were passed during the Clinton administration than during Reagan or Bush, we decided that we did not need the entire eight years in order to make a fair comparison. Therefore, we chose the RIAs used in Hahn et al. (2000). The RIAs themselves were written between 1993 and 1999, representing six years of the Clinton administration. We decided not to cover the current Bush administration because there were not sufficient data when we began our research.⁷

This study includes rules that address market failures, such as improving air quality. It excludes “transfer” rules, which are rules designed to move resources from the federal government to designated segments of the population, because agencies generally do not assess the costs and benefits of such rules (OMB 2001; OMB 2002).

⁶ We know we are missing RIAs for four rules for which we could not find complete information. These are listed in the supplementary material linked to the online manuscript.

⁷ Note that electronic copies of all the documents used in this study, as well as RIAs from other agencies, can be found in the RIA Database at www.aei-brookings.org.

IV. Results

The results of our analysis point to three key findings. The first finding is that quality, as measured by the inclusion of fundamental economic information, is generally low. The second finding is that the quality of the cost-benefit analyses does not seem to change over time and across administrations. The third finding is that individual RIAs vary widely in quality even within administrations. These results are discussed in more detail below.

A. Inclusion of Fundamental Economic Information

The findings concerning the inclusion of fundamental economic information are divided into six categories: costs, benefits, comparison of costs and benefits, consideration of alternatives, clarity of presentation, and the use of analytical assumptions.

Costs

The EPA has consistently presented cost estimates in RIAs done during the Reagan, first Bush, and Clinton administrations. Figure 1 summarizes the key results on costs. All RIAs stated that costs exist, quantified at least some costs, and monetized at least some costs. Costs are considered to be quantified if they are expressed in some countable unit, such as dollars, labor hours, or new machinery. They are considered monetized if those units are assigned monetary values, such as stating that the cost of compliance will be one hundred million dollars. Monetization implies quantification, but not vice versa.

Not all RIAs gave an estimate of total costs.⁸ In the Reagan administration, 15 percent of the RIAs provided neither a point estimate nor a range for total costs.⁹ During the Bush administration, 17 percent provided neither a point estimate nor a range, and during the Clinton administration, 4 percent provided neither a point estimate nor a range. During the Reagan and Clinton administrations, point estimates of total costs were more common than ranges. During the Bush administration, point estimates were as common as ranges. The reason for this is not clear. Few RIAs provided both a point estimate and range during any administration.

⁸ An estimate of total costs is defined as an estimate that is summed across regions of the country, affected industries, subsections of the rule or other relevant subtotals. The cost from a case study, which may apply to one or a few plants, is not considered to be an estimate of total cost.

⁹ A point estimate is defined as an estimate that is a single number, as opposed to a range. A range estimate is defined as an estimate that includes two points and is inclusive of a significant portion of the confidence interval of an estimate. Note that two case studies do not count as a range of total costs.

While virtually all of the RIAs studied included estimates of costs to producers (over 90 percent for all administrations), fewer included estimates of administrative costs to the federal government (30% or fewer for all administrations) or to state and local governments (50% or fewer).

Benefits

As shown in Figure 2, the RIAs did not present estimates of benefits as consistently as costs. Like costs, benefits are considered to be quantified if they are expressed in some countable unit, such as dollars, lives saved, or tons of pollution reduced. They are considered monetized if those units are assigned monetary values. While 100% of the RIAs monetized at least some costs, only about 50% monetized at least some benefits. The number of RIAs that quantified at least some benefits was significantly higher—exceeding 80% for all three administrations. This result suggests that some benefits are not easily monetized and/or that the agency is reluctant to monetize some benefits.

In contrast to the cost estimates, estimates of total monetized benefits were fairly evenly divided between analyses that reported point estimates and those that reported ranges. As with the estimates of costs, providing both a point estimate and a range for total monetized benefits was rare—13% or less for all three administrations. Overall, while many RIAs quantified benefits and a significant number monetized benefits, the estimation of benefits lags well behind the estimation of costs.

Comparison of Costs and Benefits

Economists frequently focus on measures of net benefits. Comparing costs and benefits gives decision makers a deeper insight into the likely impact of different policies in terms of their net benefits or the costs of achieving various goals. Unfortunately, as summarized in Figure 3, EPA has not consistently used these measures. In the Clinton administration, EPA calculated at least one measure of net benefits 39% of the time, compared with 26% during the Reagan administration and 29% during the Bush administration. For cost effectiveness, the numbers were somewhat higher—52% for Clinton, 56% for Reagan and 42% for Bush. It is not surprising that cost effectiveness was calculated more often than net benefits. This is because calculation of net benefits requires monetized costs and monetized benefits, while calculation of cost effectiveness requires only monetized costs and quantified benefits. All RIAs monetized at least

some costs, but more RIAs quantified benefits than monetized benefits. Therefore, more RIAs had the information necessary to calculate cost effectiveness rather than net benefits.

RIAs tended to calculate either cost effectiveness or net benefits, but rarely both. During the Clinton administration, 74% of the RIAs calculated a measure of either net benefits or cost effectiveness. For the Reagan and Bush administrations, the numbers were lower—70% and 50%, respectively. No more than 21% of RIAs in any administration reported both net benefits and cost effectiveness.

These findings illustrate how difficult it would be to use basic quantitative information on net benefits or cost effectiveness for decision making. In 35% of the regulations examined here, such information simply is not reported. Indeed, net benefit information does not exist for 69% of the RIAs in the sample. However, EPA does not appear to be using all of the quantitative information that it does have to calculate net benefits and cost effectiveness. Of the rules in the sample that monetized benefits, only 58% calculated net benefits. Of the rules in the sample that quantified benefits, only 74% calculated cost effectiveness or net benefits. This suggests that comparisons of costs and benefits are not occurring in a large number of cases for which the necessary data are actually available.

As shown in Figure 4, there are some differences in the presentation of these data across administrations. In all three administrations, the EPA preferred point estimates to ranges for total cost effectiveness. But for total net benefits during the Reagan and Clinton administrations, however, the EPA preferred ranges to point estimates. In addition, the percentage of RIAs presenting total cost-effectiveness estimates has grown across administrations. During the Reagan administration, only 37% of RIAs presented a point or range estimate of total cost effectiveness. That number increased to 42% during the Bush administration and to 48% during the Clinton administration. An RIA could get credit for some measure of cost effectiveness, but not for a total estimate of cost effectiveness, if for example, it calculated the cost effectiveness using only a case study estimate instead of a national average. A cost-effectiveness estimate was scored as a total estimate if the numerator (the costs) met the definition of total cost given above.

Consideration of Alternatives

Evaluation of alternatives is critical in determining which policies yield the highest net benefits. An alternative is defined as any policy that seeks to achieve the same end through a different method (e.g., pollution trading or taxation, self-regulation) or at a different level (e.g.,

emissions are capped but at a higher or lower level). In this study, not regulating was considered an alternative if the RIA provided specific calculations or an analysis of that scenario. Background information on externalities or market failures was not scored as an analysis of not regulating.

Figure 5 provides some key statistics on the consideration and presentation of alternatives in the RIAs. For several items on the scorecard, the reporting on alternatives has gotten worse over time. The percentage of RIAs that considered at least one alternative standard or level decreased from 85% during the Reagan administration to 74% during the Clinton administration. The percentage that monetized the costs of alternatives dropped from 78% to 43% and the percentage that quantified the benefits of alternatives decreased from 59% to 35%. In contrast, there has been no decline in the monetization of benefits of alternative policies.

In terms of net benefits and cost effectiveness, there has been a general pattern of incomplete comparisons of alternatives (see Figure 6). The percentage of RIAs that calculated cost effectiveness of alternatives decreased across administrations, from 37% during the Reagan administration to 33% during the Bush administration to 9% during the Clinton administration. The calculation of the net benefits of alternatives was not very common either, with only 27% of the RIAs calculating any net benefits of alternatives. The percentage of RIAs that calculated either net benefits or cost effectiveness of alternatives peaked at 59% in the Reagan administration and averaged 46% for all RIAs.

Clarity of Presentation

In addition to presenting estimates of costs and benefits, RIAs should help the public understand EPA's decisions. In fact, the objective of Executive Order 12866 was to make the process "more accessible and open to the public." A clear and transparent presentation is vital to fulfilling this goal. Since RIAs are often hundreds of pages long, it is important for RIAs to have an executive summary (called an introduction in some RIAs). Approximately 80% of the RIAs included an executive summary. Figure 7 summarizes the content of these executive summaries. Overall, the percentage of RIAs that included an executive summary decreased from 85% during the Reagan administration to 70% during the Clinton administration. The percentage of RIAs that included an executive summary with some monetized costs decreased from 78% during the Reagan administration to 70% during the Clinton administration. The percentage that included an executive summary with some monetized benefits increased from 41% during the Reagan

administration to 52% during the Clinton administration. Approximately 46% had executive summaries that compared costs and benefits, ranging from about 25% during the first Bush administration to about 57% during the Clinton administration. Although most of the RIAs contained executive summaries, only a small fraction of them included all of the key calculations from the RIA.

Use of Analytical Assumptions

A clear statement of important assumptions is essential to understanding an RIA. So, too, is the consistent application of basic ideas. Since an assessment of all key parameters was impossible, we examined the discount rate and the dollar year—two parameters that are critical to most RIAs. Including this information helps interested parties understand the results. Furthermore, many regulations have an important time component, meaning that either costs or benefits are spread out over multiple years. Failing to use the same dollar year or to discount future cash flows can be problematic when benefits and costs vary across time.

The dollar year was identified in 73% of the RIAs, with a low of 69% during Bush and a high of 78% under Clinton. The discount rate was identified with similar frequency: 67% during the Reagan administration, 75% during the Bush administration and 83% during the Clinton administration. Figure 8 summarizes the presentation of the discount rate across administrations. Despite continuing academic debate over the correct discount rate to use in policy-making, a point estimate is much more common than a range estimate under all three administrations. Also, fewer than half of the RIAs specified whether the discount rate was real or nominal.

B. Implications for Compliance with Executive Orders and OMB Guidelines

Although low scores on our scorecard strongly suggest non-compliance with executive orders and OMB guidelines, they do not prove it. Both executive orders make exceptions for cases where information is difficult to obtain. It may be the case that all the items not included on an RIA were those that were difficult to obtain. In addition, some of the items we included on our scorecard are not explicitly required by the executive orders and OMB guidelines, though we think they are important components of a strong RIA. Nevertheless, we believe that there is evidence of at least some non-compliance with the executive orders and OMB guidelines.

For example, although both executive orders clearly require an assessment of all costs and benefits of alternative approaches, fourteen RIAs do not examine alternatives. Since the EPA

guidelines provide information on various alternatives for different types of regulation, it is hard to believe that this information was difficult to obtain (EPA 1983). Of course, it is nearly impossible to test whether EPA did everything it could have done, but we can examine whether the agency utilized the available information it developed in its cost-benefit analysis. We examine cases where the RIA presented some measure of the costs or benefits of the regulatory proposal and did not do so for alternatives. In such cases, the absence of key information for an alternative when such information was presented for the proposed method suggests that the information could have been provided, perhaps at some additional cost. Of the sixty RIAs that monetized at least some costs and considered at least one alternative, eleven did not monetize at least some costs of alternatives. Of the thirty-seven RIAs that monetized at least some benefits and considered at least one alternative, thirteen did not monetize at least some benefits of alternatives. Of the forty-four RIAs that calculated net benefits or cost effectiveness and considered at least one alternative, ten did not calculate net benefits or cost effectiveness of alternatives. Finally, sixteen of the thirty-nine RIAs that monetized at least some costs and benefits did not calculate net benefits for the proposal.

Consistent with earlier research, we also identified a number of cases in which the agencies quantified, but did not monetize benefits. For example, our sample includes two RIAs that quantified lives saved, but did not monetize any benefits, even though the Value of Statistical Life has been studied extensively. This suggests that limited knowledge and resource constraints do not offer a complete explanation for why the agency chose not to develop certain benefit estimates, since the additional expenditures for monetizing these benefits are, in these two cases, trivial.

C. Trends in Quality and Variation in Quality

Based on the results from our scorecard, we find no clear trend in the quality of cost-benefit analysis across administrations. While these results do not rule out the possibility that RIAs are improving in ways we did not measure, they do show that some basic information is missing from RIAs in all three administrations. What is missing does change over time, but, as indicated in the figures, there is no clear trend. For example, Figures 3 and 5 reveal that while there has been some improvement in the calculation of net benefits and cost effectiveness, there has also been some decline in the consideration of alternatives. We performed a formal statistical analysis of the data, which also indicated that there is no strong statistical evidence of a change

in RIA quality across administrations or time. The detailed methodology and results of this analysis are available online as supplementary material linked to the online manuscript.

While there does not appear to be a trend in quality, there does appear to be considerable variation both within and across administrations. To examine this issue further, we constructed two indices consisting of selected variables on which RIAs were scored. The index score for each RIA was defined as the percentage of questions on which the RIA received a positive score. The first index consisted of twenty-eight out of the scorecard's seventy-nine questions. The second index was more restrictive, consisting of the six scorecard items that we thought were particularly important for determining the economic efficiency of a regulation. These were whether the RIA provided 1) a point estimate of total monetized costs; 2) a range for total monetized costs; 3) a point estimate of total monetized benefits; 4) a range for total monetized benefits; 5) a point estimate of total net benefits; and 6) a range for total net benefits. The correlation between these two indices is 71%, which means that an RIA that scored well on one index was likely to score well on the other. We examined how the scores of RIAs varied within administrations by graphing both indices over time. We found variation to be high both within and across administrations. These results and detailed information on the questions that were included in the two indices are available online as supplementary material linked to the online manuscript.

V. Implications and Policy Recommendations

Overall, the scorecard method is a useful, but imperfect tool for evaluating RIAs. Even if a regulatory agency complies with the executive orders and the OMB guidelines, the deeper issue concerning the assessment of quality remains to be addressed. A high score using our criteria does not necessarily mean that the agency performed a high quality analysis, because the agency could have masked analytical flaws. For example, the RIA for the rule reducing lead in gasoline was ranked highly by our scorecard and has been rated a high-quality regulation by Morgenstern (1997). The RIA for the National Ambient Air Quality Standards for Ozone also scored very well, but the analysis has been sharply criticized. Although the RIA includes important economic information, some of the RIA's assumptions are faulty. The cost estimates are not substantiated and the beneficial role of ozone in blocking UV-B radiation was ignored (Lutter and Gruenspecht 2001). Some regulations, such as information disclosure rules, have

benefits that are very hard to quantify and are therefore likely to score very low on a scorecard, even if EPA did everything possible to analyze benefits. One example contained in this sample is the addition of industries to the toxic chemical release reporting Community Right-to-Know rule.

Other rules may consider alternatives, but not necessarily alternatives that are most attractive from an economic point of view. The scoring used here only measures whether alternatives were considered, not whether they are reasonable or represent all potential alternatives. In many cases, RIAs do not consider carefully options that would allow for more flexibility to achieve social goals at lower costs. This was the case, for example, with recent rules involving lead and arsenic.

Thus, it is unclear from our analysis how many RIAs are of high quality. A low score on the scorecard is an indicator of a potentially poor quality analysis, particularly if the agency did not assess key economic variables, such as the net benefits of a regulation. Many RIAs are missing fundamental economic information, making it difficult to effectively use the RIAs to make informed policy decisions. If quality is partly measured by the extent to which an RIA can contribute to better decision making, our analysis suggests that many RIAs are of poor quality.

A. Why Are the Scores So Low?

A critical question raised by the results of our study is why compliance with cost-benefit requirements appears to have been relatively low and shows no clear sign of improving. We believe that there are several possible explanations. One possible explanation is that the approach of political institutions toward the regulatory policy process has not changed much over the time period examined here. Congress has been willing to support some analysis of regulations to help inform the policy process, but it is not ready to let economic analysis drive the political debate on many issues. The president recognizes the need to introduce greater transparency and accountability into the regulatory process, but regulation is not generally an area where he wishes to spend limited political capital. While this explanation is consistent with the data, there are other explanations as well. For example, agency appointees, at EPA and elsewhere, do not face a strong incentive to do high-quality analysis. They are generally rewarded for promulgating and implementing regulations, not studying them.

Moreover, analysis may be viewed only as a necessary evil. Indeed, there appear to be few sanctions for doing poor analysis. In addition, regulatory analyses are expensive to perform,

and agencies often do not have the funding to conduct them effectively. Finally, there is limited political support for improving the economic analysis of pending regulations.

An agency's RIA could receive a low score for at least three reasons. First, the agency may face resource constraints. A thorough cost-benefit analysis requires a great deal of scientific and economic information, and EPA may not have the resources to do the necessary research. Previously, however, we examined evidence that suggested that resource constraints are not a complete explanation for why the agency chose not to develop certain benefit estimates. Nonetheless, it may not always be feasible to quantify some benefits, for example, which can lead to lower scores.

A second reason is that the agency may not want interested parties to know that the benefits of the regulation may not justify the costs. Previous research suggests that a significant number of government rules would not pass a cost-benefit test based on those costs and benefits that had been quantified (Freeman 2002; Hahn et al. 2000). Specifically, Hahn et al. (2000), looked at several agencies during the Clinton administration and found that of the 31 RIAs that provided estimates of costs and benefits that were sufficient to calculate net benefits, only half had benefits and cost savings that exceeded the costs. Three-fourths of RIAs that calculated net benefits passed a cost-benefit test, while only one third of RIAs that did not calculate net benefits pass a cost-benefit test. Alternatively, EPA may not compare costs and benefits because the agency does not believe the comparison is instructive. For example, there may be too many benefits or costs that are not quantified for the comparison to be valuable. Even when all information is not available, however, we think it is useful to report a net benefit estimate with caveats then to not present one at all. In addition, EPA might not want to admit that a decision was the result of a political compromise. Alternatively, EPA may be reluctant to criticize a decision that was essentially made by Congress or the President.

Third, the agency may simply not take the RIA requirement seriously because it is not enforced. We suspect that lack of political will on the part of the Executive Office of the President is a major factor in the high degree of noncompliance. There is a significant political cost to changing the behavior of a regulatory agency, but the political payoffs of doing so are typically low (Noll 1999).

B. Recommendations for Reform

There are many possible paths for reform—too numerous to mention here (Breyer 1993; Hahn 2000; Noll 1999). If the aim is to improve the quality and transparency of analysis, we would recommend two modest changes: the first is more vigilant oversight by OMB; the second is to use a standardized “Regulatory Impact Summary” that would accompany each regulatory impact statement (Farrow 2000; Hahn and Sunstein 2002).

More vigilant oversight by OMB would put agencies on notice that the executive order requiring cost-benefit analysis needs to be taken seriously. Such efforts, to be effective, would require high-level White House support either from the vice president or the president. In addition, it would be helpful if Congress lent its support.

The regulatory impact summary requirement could be implemented more easily by OMB. By requiring agencies to submit such a summary with each proposed regulation, OMB would encourage agencies to pay more attention to whether their analyses meet fundamental criteria. For example, if an agency is required to report whether it has quantified and monetized pollution benefits, identified a best estimate for the regulation’s expected net benefits, or identified the dollar year in which it has stated its estimates, the agency will be less inclined to submit an analysis that ignores these features.

We do not believe this requirement would impose a significant burden on the agency because it does not require more analysis—only a summary of the analysis the agency has already done. Responding to a standardized set of straightforward questions about that analysis should require a minimal amount of extra time and resources.

The benefits of this exercise however, could be significant. Such a summary could keep agencies focused on the key requirements of the executive orders. It could help regulators and decision makers determine the strengths and weaknesses of the underlying analysis. It would also facilitate a straightforward assessment of the degree to which regulatory analyses are meeting several important criteria. A standardized summary would also encourage standardized RIAs, which currently vary widely in format.

The two changes suggested above could help make the regulatory process more transparent. Aside from being desirable for its own sake, this would serve two important purposes. First, it would give interested parties greater access to a key part of the regulatory process used to support a decision. Second, it would increase the probability that scholars would engage in independent regulatory analysis that could lead to improvements in regulation. Thus,

greater transparency could both improve the decision-making process and create a better foundation for evaluating the analytical basis for decision-making.

VI. Conclusion

This paper has provided a systematic examination of a select sample of cost-benefit analyses that span the Reagan, Bush, and Clinton administrations. Our principal finding is that fundamental economic information was not reported in many of the RIAs, including information on relevant policy alternatives and information on net benefits. EPA's analyses frequently did not provide adequate information about a proposed regulation to justify decisions to proceed with that regulation. The absence of information on net benefits is especially unfortunate because it is so closely linked to the goals of the executive orders. In addition, many RIAs lacked adequate summaries.

Our analysis also suggests that many RIAs are of poor quality. Despite the limitations of the scorecard method, we believe that a low score on the scorecard is likely to be correlated with an analysis that experts would say was done poorly. Future research is needed to explore whether expert judgment about the quality of a regulatory analysis is correlated with the scorecard approach used here.

We believe that all of the administrations could have done better in complying with the spirit or letter of the relevant executive orders and OMB guidelines. Because our sample covers two Republican presidents and one Democratic president, the lack of compliance cannot be explained simply by the party of the president.

The picture we paint here is not as rosy as we would have hoped. Indeed, some academics have suggested to us that government cost-benefit analysis may be doomed because it is done in an intensely political environment. While it is true that such analyses are done in intensely political environments, this does not imply that they cannot be done better or used more effectively. Academics can be helpful here in two ways: first, by characterizing the impact of cost-benefit analysis in the real world; and second, by defining better ways to apply this tool that are also politically feasible.

We offer one final thought that should give the optimists—those of us who see a constructive role for cost-benefit analysis—some reason for cheer. We are all relatively new at this game, especially in terms of real-world implementation. Knowledge about new processes accrues, and frequently diffuses, slowly. We are guardedly optimistic that cost-benefit analysis

will be used more effectively twenty-five years from now than it is today, precisely because we will have learned more about its strengths and limitations in real-world settings.

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Figure 1: Analysis of Costs

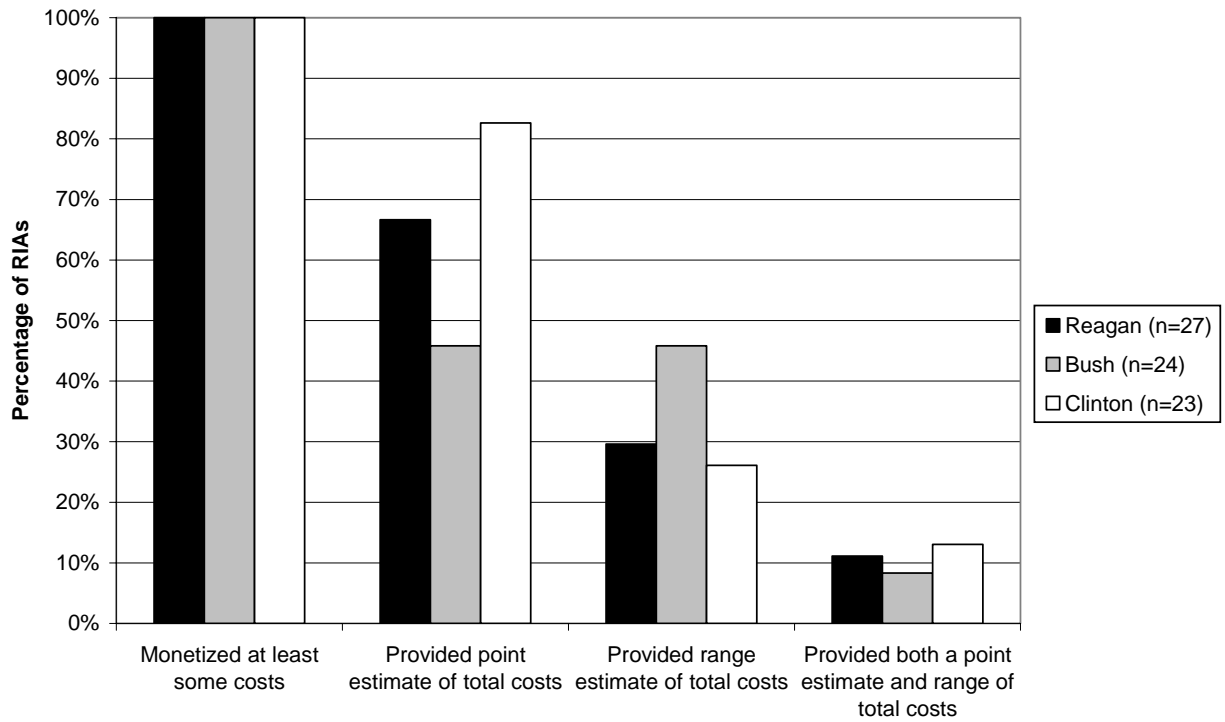


Figure 2: Analysis of Benefits

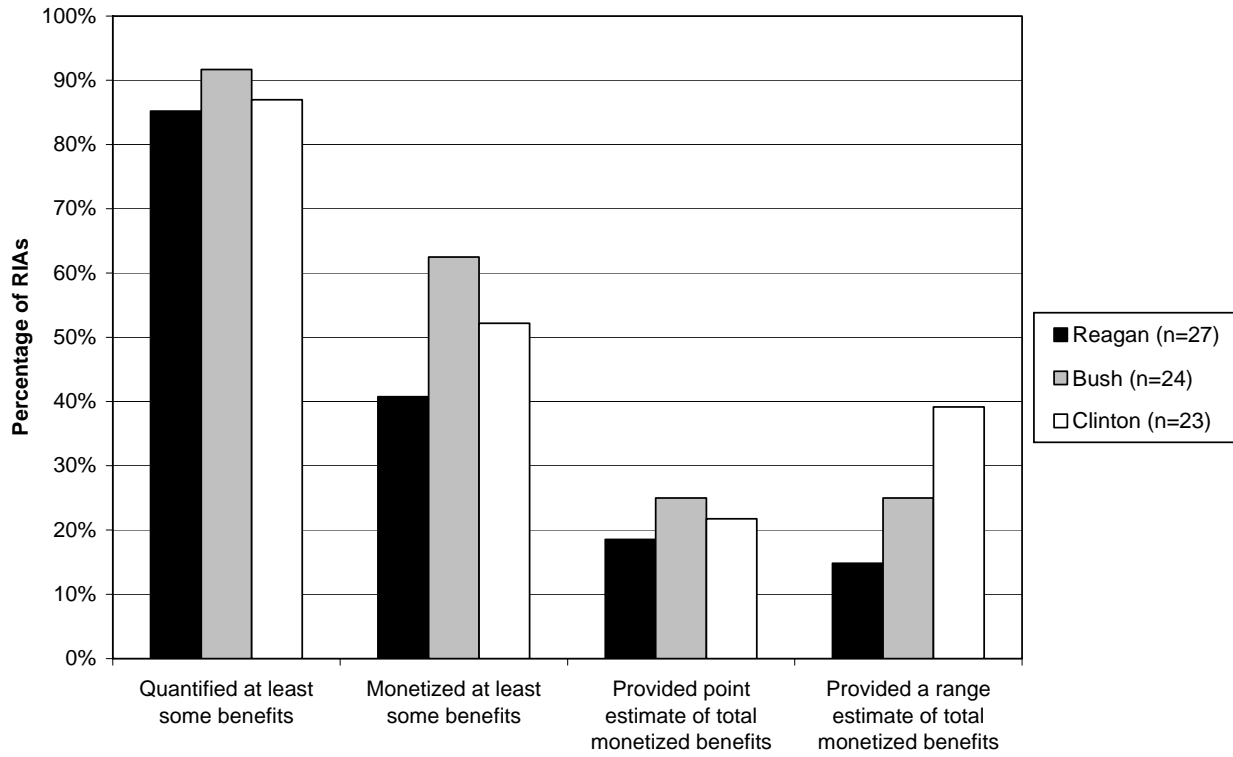


Figure 3: Analysis of Net Benefits and Cost Effectiveness

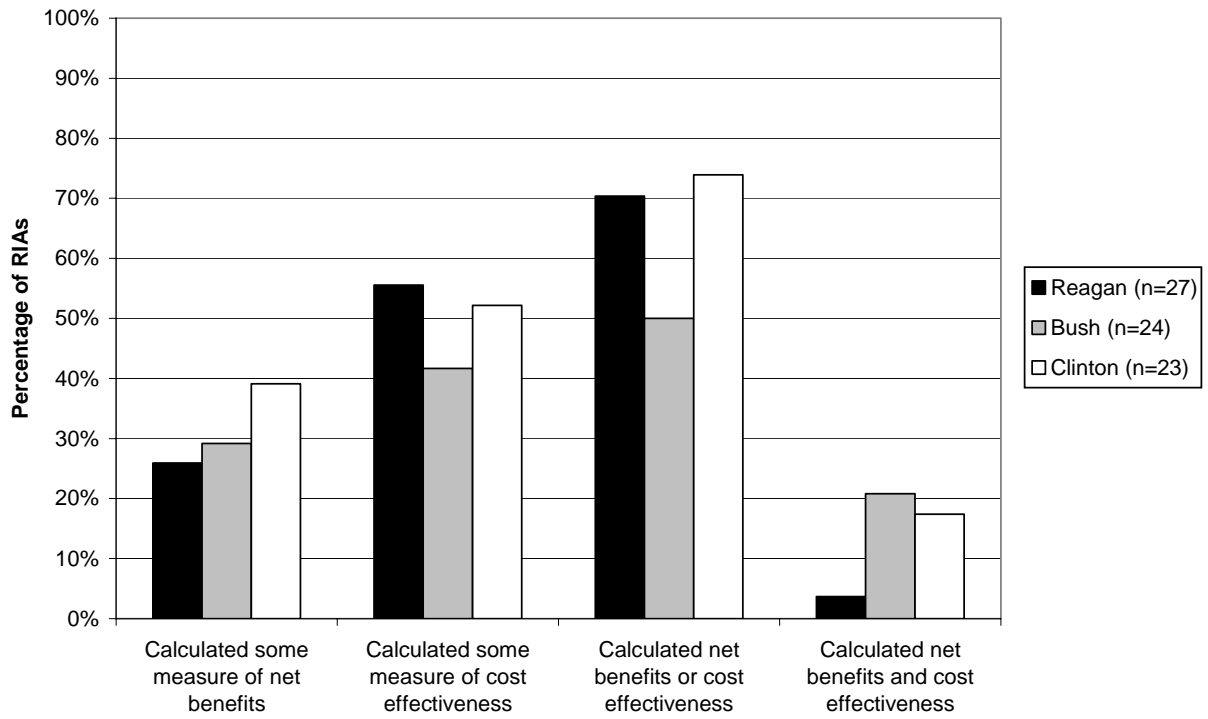


Figure 4: Point Estimates and Ranges for Net Benefits and Cost Effectiveness

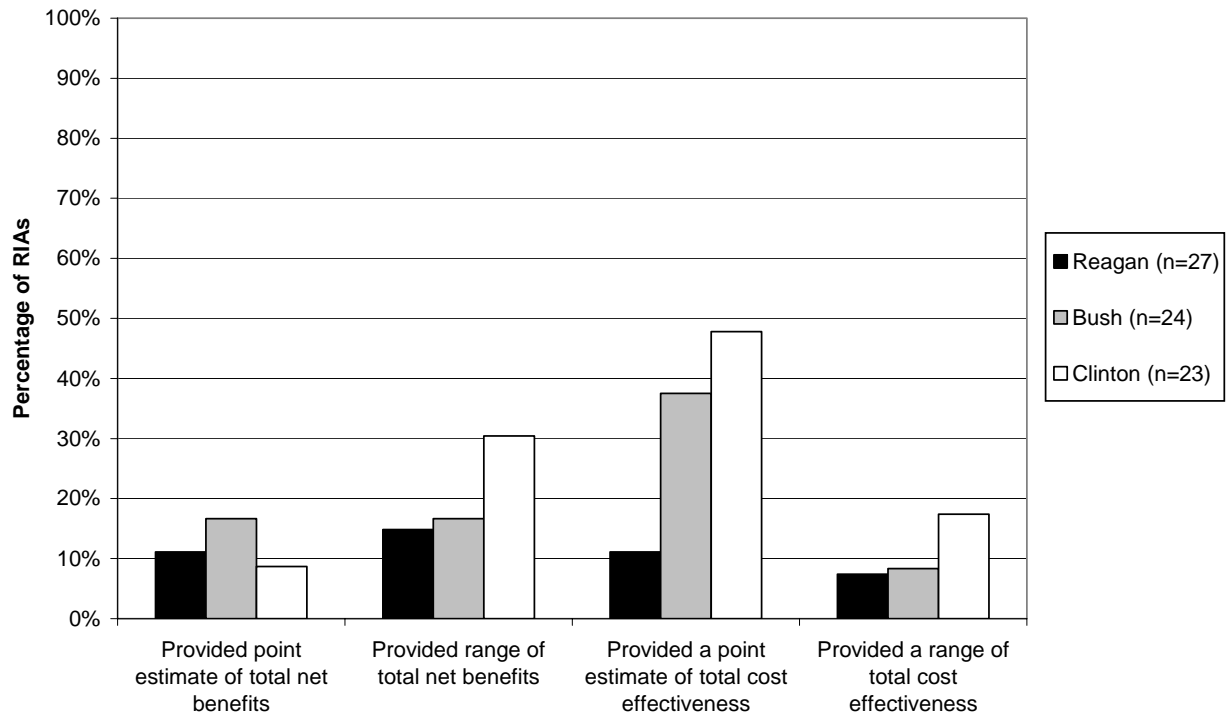


Figure 5: Consideration of Alternatives

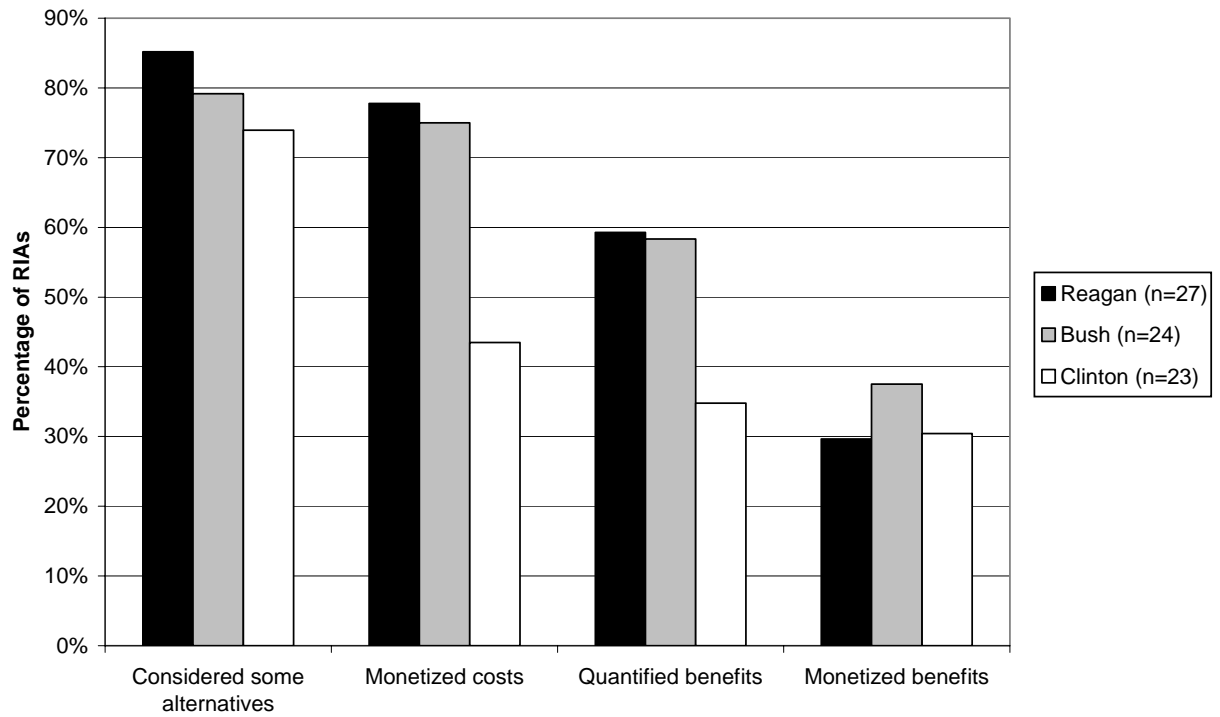


Figure 6: Cost Effectiveness and Net Benefits of Alternatives

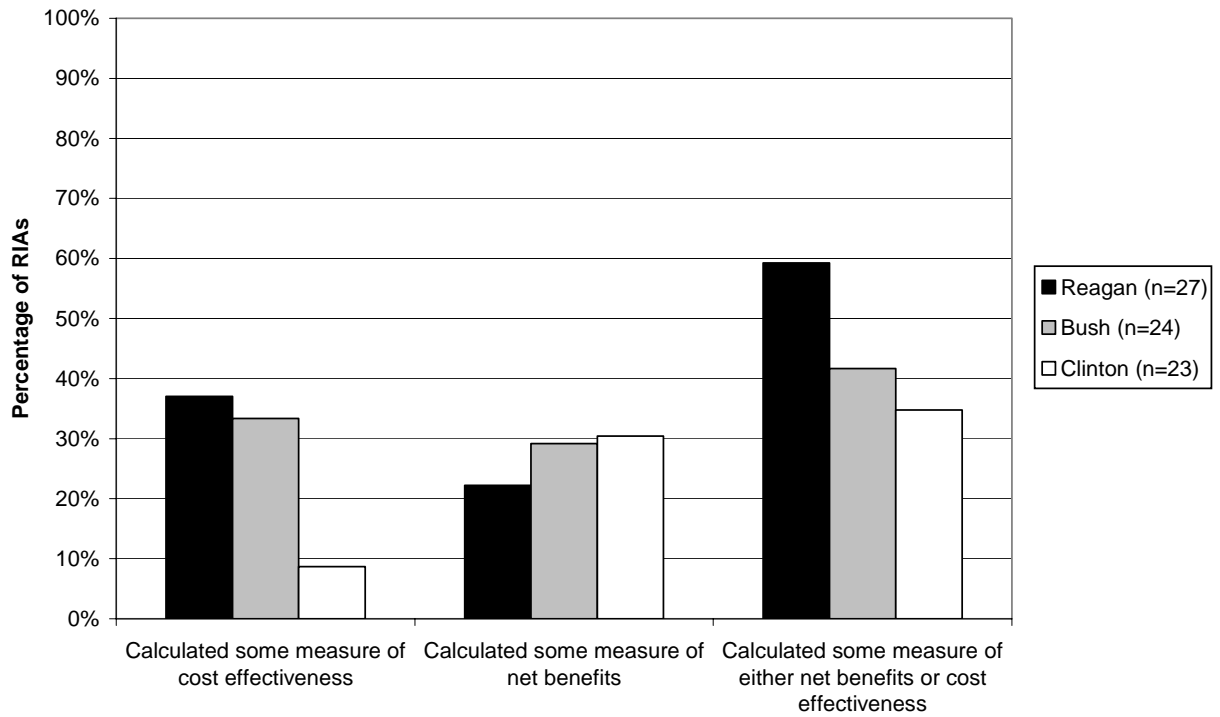


Figure 7: Executive Summary

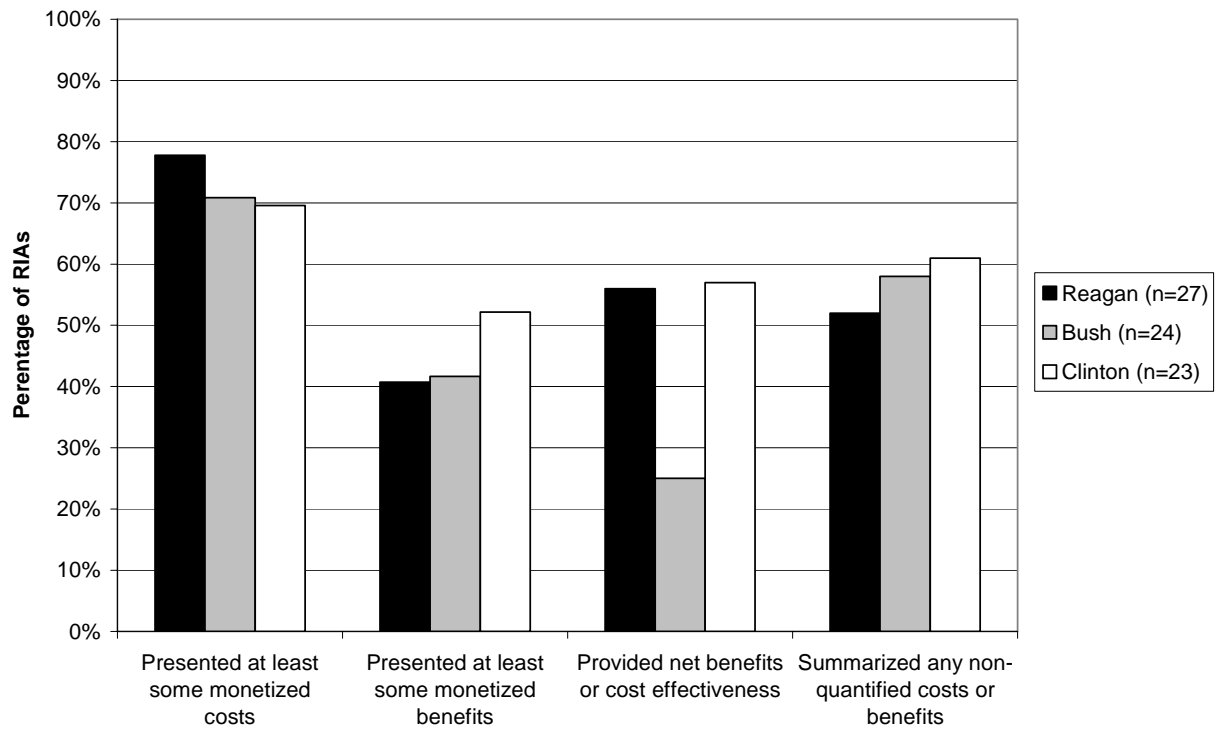
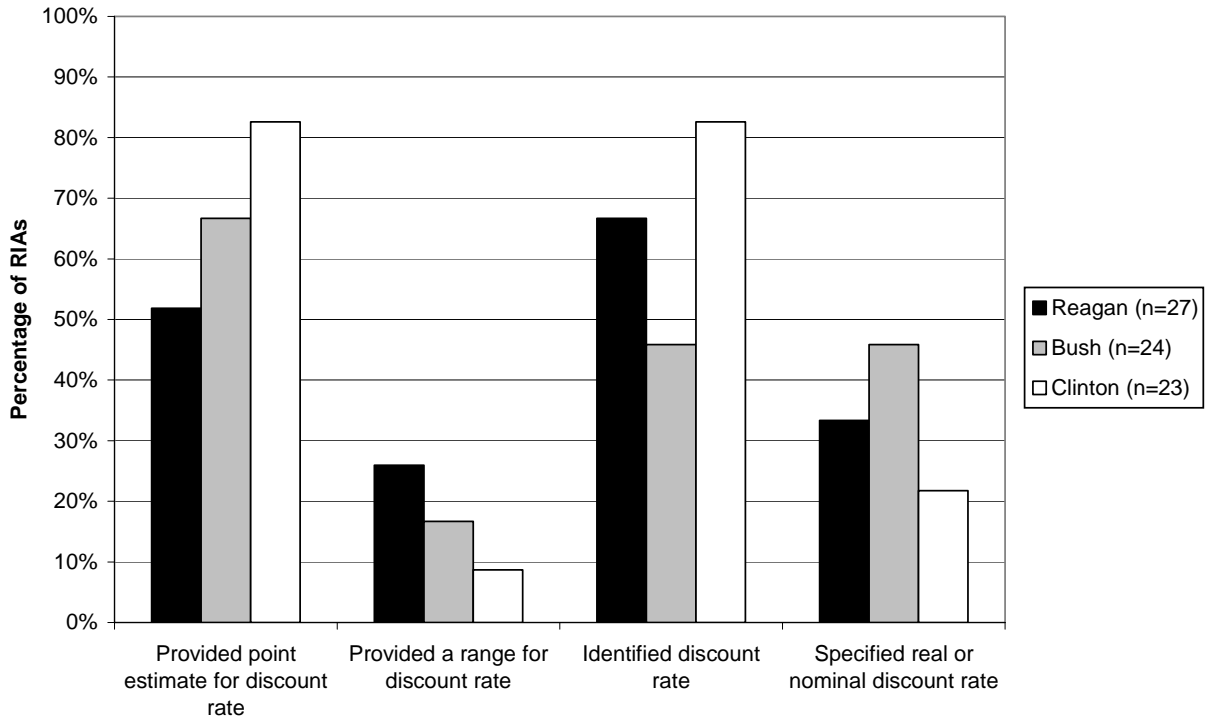


Figure 8: Discount Rate



Supplementary Material for “How Well Does the U.S. Government Do Cost-Benefit Analysis?”

Robert W. Hahn and Patrick M. Dudley

The Supplementary Material includes a list of all the RIAs in the sample, a list of all the questions on the scorecard, a list of four missing RIAs, a note on the methodology, and an appendix with the technical explanations for two findings described in the paper. We also list additional references that we found useful. The list of RIAs is organized by presidential administration. Table 1 includes all the Reagan RIAs, Table 2 includes all the first Bush RIAs, and Table 3 includes all the Clinton RIAs. Table 4 lists the scorecard questions by number and organized by type. The note on methodology details the procedure followed for scoring.

The appendix describes the analysis used to support two conclusions in the paper: 1) that the quality of RIAs has not changed over time and 2) that the quality of individual RIAs varies widely within administrations. We describe the empirical methodology behind the first conclusion, detailing the statistical analyses we performed. We also present the summary statistics and the graphical evidence for the second conclusion.

Table 1: RIAs from the Reagan Administration Used in this Study

RIN	Title	Date of RIA
2070-AA07	Data Requirements for Registering Pesticides Under the Federal Insecticide, Fungicide and Rodenticide Act	1982
2040-xxx2*	Final Effluent Limitations Guidelines, New Source Performance Standards and Pretreatment Standards for the Iron and Steel Manufacturing Point Source Category	1982
2040-AA04	Effluent Standards and Limitations for the Metal Finishing Industry	1983
2060-AA62	National Ambient Air Quality Standards for Particulate Matter	1983
2070-AA70	Nonsubstation PCB Transformers	1985
2050-AA00	Proposed Standards for the Management of Used Oil	1985
2060-AB30	Stack Height Regulations	1985
2060-AC40	Listing of Surface Coal Mines for New Source Review	1985
2060-AB50	Reducing Lead in Gasoline	1985
2060-AA52	Control of Air Pollution from New Motor Vehicles and New Motor Vehicle Engines: Gaseous Emissions Regulations for 1987 and Later Year Light-Duty Vehicles; and for 1988 and Later Model Year Light-Duty Trucks and Heavy-Duty Engines; Particulate Emission Regulations for 1988 and Later Model Year Heavy-Duty Diesel Engines	1985
2060-AA64	National Ambient Air Quality Standards for Nitrogen Dioxide	1985
2060-AA63	National Ambient Air Quality Standards for Carbon Monoxide	1985

RIN	Title	Date of RIA
2050-AA30(A) ⁺	Proposed Restrictions on Land Disposal of Hazardous Wastes	1985
2060-AB33	New Source Performance Standards: Industrial-Commercial-Institutional Steam Generating Units of Greater than 100 million BTU/hr Heat Input	1986
2050-AA30(B) ⁺	Restrictions on Land Disposal of Certain Dioxin-Containing Wastes	1986
2060-AB68	Residential Wood Heater New Source Performance Standard	1986
2050-AB19	Proposed Technical Standards for Underground Storage Tanks	1987
2050-AB65	Restrictions on Land Disposal of California List Wastes	1987
2040-AA05	Effluent Guidelines Regulation for the Organic Chemicals, Plastics and Synthetic Fibers Industry	1987
2070-AB44	Schools Rule, Asbestos Hazard Emergency Response Act	1987
2050-AC13	Land Disposal restrictions on First Third Wastes	1988
2060-AC80	Protection of Stratospheric Ozone	1988
2070-AB71	Rulemaking Under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986	1988
2060-AA61	National Ambient Air Quality Standards for Sulfur Oxides (Sulfur Dioxide)	1988
2050-AA75	Revisions to the National Oil and Hazardous Substances Contingency Plan	1988
2050-AB89	Financial Responsibility Requirements for Petroleum Underground Storage Tanks	1988
2070-AB29	Asbestos: Controls on Asbestos and Asbestos Products	1989

Table 2: RIAs from the Bush I Administration Used in this Study

RIN	Title	Date of RIA
2060-AC26	Air Pollutant Emissions Standards and Guidelines for Municipal Waste Combustors	1989
2050-AB88	EPCRA Section 311 and 312: Emergency and Hazardous Chemical Inventory Forms and Community Right to Know Reporting Requirements	1989
2060-AB94	Hazardous Waste Treatment and Disposal Facilities: Organic Air Emission Standards for Tanks, Surface Impoundments, and Containers	1989
2060-AD91	Costs and Benefits of Phasing out CFCs and Halons	1989
2050-AB21	Subtitle D Criteria for Solid Waste Landfills	1990
2050-AA78	Toxicity Characteristic	1990
2050-AC73	Land Disposal Restrictions for Third Third Scheduled Wastes	1990
2060-AB89	Phase II Gasoline Volatility Regulations	1990
2060-AC00	Control of Sulfur and Aromatics Contents of On-Highway Diesel Fuel	1990
2040-AA55	National Primary Drinking Water Regulations for Synthetic Organic Compounds	1990
2050-AB70	Listings of Primary and Secondary Oil/Water/Solids Separation Sludges from the Treatment of Petroleum Refinery Wastewaters	1990
2050-AC43	Listing of Certain Wood Preserving Wastes	1990
2040-xxx3*	Land Application of Bleached Pulp and Paper Mill Wastewater Treatment Sludges	1991
2060-AD28	Reformulated Gasoline and Anti-Dumping Regulations	1991
2040-AB51	Maximum Containment Level Goals and National Primary Drinking Water Regulations for Lead and Copper	1991
2070-xxx4*	Pesticides and Ground Water Strategy: A Survey of Potential Impacts	1991
2060-AD74	Assessments of the Long-Run Costs of the Oxygenated Fuel Provisions	1991
2060-AD25	Tier 1 Light-Duty Tailpipe Standards and Useful Life Requirements	1991
2060-xxx1*	Compliance with Section 604 of the Clean Air Act for the Phaseout of Ozone Depleting Chemicals	1992
2050-AD25	CAA Section 112: Listing Regulated Substances and Thresholds and Mandating Risk Management Programs for Chemical Release Prevention	1992
2040-AB11	National Primary Drinking Water Regulations: Phase V Synthetic Organic and Inorganic Chemicals	1992
2060-AD16	Screening for Operating Permits	1992
2070-AA49	Worker Protection Standards for Agricultural Pesticides	1992
2060-AD89	Inspection and Maintenance Program	1992

Table 3: RIAs from the Clinton Administration Used in this Study

RIN	Title	Date of RIA
2040-AB53	National Emissions Standards for Hazardous Air Pollutants for Source Category: Pulp and Paper Production; Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards: Pulp, Paper, and Paperboard Category	1993
2060-AE29	Phase 2 Emission Standards for New Nonroad Spark-ignition Nonhandheld Engines at or below 19 kilowatts	1994
2060-AE54	New Gasoline Spark Ignition and Compression-Ignition Marine Engines; New Non-Road Compression-Ignition Engines and Spark-Ignition engines, Exemptions	1994
2060-AE27	Final Regulations for Revisions to the Federal Test Procedure for Emissions from Motor Vehicles	1995
2060-AF75	New Motor Vehicles and New Motor Vehicle Engines Air Pollution Control: Voluntary Standards for Light-duty Vehicles; Final Rule	1995
2060-AF48	Acid Rain, Phase II, Nitrogen Oxides Emission Reduction Program	1995
2050-AD38	Land Disposal Restrictions Phase III; Decharacterized Wastewaters, Carbamate Wastes, and Spent Aluminum Potliners	1996
2050-AD26	Accidental Release Prevention Requirements: Risk Management Programs under Clean Air Act Section 112(r)(7)	1996
2060-AG06	Regulation of Fuels and Fuel Additives: Certification Standards for Deposit Control Gasoline Additives	1996
2070-AC64	Lead; Requirements for Lead-Based Paint Activities in Target Housing and Child-Occupied Facilities	1996
2050-AD04	Financial Assurance Mechanisms for Local Government Owners and Operators of Municipal Solid Waste Landfill Facilities	1996
2070-AC71	Addition of Facilities in Certain Industry Sectors, Toxic Chemical Release Reporting, Community Right-to-Know	1997
2060-AE56	Revision of Standards of Performance for Nitrogen Oxide Emissions From New Fossil-Fuel Fired Steam Generating Units; Revisions to Reporting Requirements for Standards of Performance for New Fossil-Fuel Fired Steam Generating Units	1997
2060-AC62	Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Hospital/medical/infectious Waste Incinerators	1997
2060-AE57	National Ambient Air Quality Standards for Ozone; Final Rule	1997
2060-AE66	National Ambient Air Quality Standards for Particulate Matter; Final Rule	1997

RIN	Title	Date of RIA
2060-AF76	Control of Emissions of Air Pollution from Highway Heavy-duty Engines	1997
2060-AD33	Emission Standards for Locomotives and Locomotive Engines	1997
2070-AC01	Disposal of Polychlorinated Biphenyls	1998
2060-AH10	Findings of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Transport of Ozone	1998
2040-AB82	National Primary Drinking Water Regulations: Disinfectants and Disinfection Byproducts	1998
2040-AC91	National Primary Drinking Water Regulations: Interim Enhanced Surface Water Treatment	1998
2060-AF32	Regional Haze Regulations	1999

Notes: RIN indicates “Regulation Identifier Number.”

* Indicates that the real RIN could not be found or that none was given. The number given is how the RIA is listed in the Joint Center RIA Database.

+ Although both of these documents were considered part of the same rule, and therefore given the same RIN, we treated them as separate analyses because they are rather distinct from each other.

Table 4: Variables Used in Data Collection

Item Number	Variables
	Estimation of Costs
1	Stated costs exist
2	Quantified at least some costs
3	Monetized at least some costs
4	Monetized all or nearly all costs
5	Provided point estimate of total costs
6	Provided range for total costs
7	Associate costs w/ federal Government
8	Associate costs w/ non-federal government
9	Associate costs with producers
10	Provided best estimate and range for total costs
	Estimation of Benefits
11	Stated benefits exist
12	Quantified at least some benefits
13	Monetized at least some benefits
14	Monetized all or nearly all benefits
15	Provided point estimate of total benefits
16	Provided range for total benefits
17	Monetized safety benefits
18	Monetized health benefits
19	Monetized pollution reduction benefits (not health related)
20	Monetized pollution reduction benefits (health related)
21	Provide best estimate or range for total benefits
22	Provided best estimate and range for total benefits
23	Monetized any health-related benefits
	Comparison of Costs and Benefits
24	Calculated net benefits
25	Provided a point estimate of net benefits
26	Provided a range for net benefits
27	Calculated cost effectiveness
28	Provided a point estimate of cost effectiveness
29	Provided a range for cost effectiveness
30	Provided a point estimate or range for total cost effectiveness
31	Had positive net benefits
32	Calculated net benefits or cost effectiveness
33	Calculated net benefits and cost effectiveness
53	Calculated both point estimate and range for net benefits
54	calculated either point estimate or range for net benefits
	Evaluation of Alternatives
34	Gave at least one alt. standard/level
35	Gave at least one alt. method
36	Quantified alternatives (costs)
37	Monetized alternatives (costs)
38	Quantified alternatives (benefits)
39	Monetized alternatives (benefits)
40	Cost effectiveness of alternatives
41	Net benefits of alternatives
42	Calculated net benefits or cost effectiveness of alternatives
43	Considered some alternative
	Clarity of Presentation

Item Number	Variables
44	Contain executive summary
45	Summary contains tables
	Consistent Use of Analytical Assumptions
46	Identified dollar year
47	Used consistent dollar year
48	Identified discount rate
49	Used consistent discount rate
50	Discount rate = 7%
51	Consistent costs and benefits
52	Identified and consistently used discount rate and dollar year
	Lives
55	Point estimate for number of lives saved
56	Range estimate for number of lives saved
57	What was the point (or range) estimate of lives saved?
58	Point estimate for number of life-years saved
59	Range estimate for number of life-years saved
60	What was the point (or range) estimate of life-years saved?
	VSL
61	Point estimate for VSL
62	Range estimate for VSL
63	Point estimate for VSLY
64	Range estimate for VSLY
65	What was the point (and/or range) estimate of VSL or VSLY?
66	Did RIA give \$ year for VSL (or VSLY)?
67	What was the \$ year for VSL (or VSLY)?
	Discount Rate
68	Point estimate for discount rate
69	Range estimate for discount rate
70	What was the point (and/or range) estimate for discount rate?
71	Did the RIA specify real or nominal discount rate?
72	Was the discount rate real or nominal?
	Executive Summary
73	ES present at least some monetized costs
74	ES present at least some monetized benefits
75	ES present any measure of cost effectiveness
76	ES present any estimate of net benefits
77	ES offer a best judgment of how benefits and costs compare
78	ES summarize any non-quantified benefits
79	ES summarize any non-quantified costs

Notes: VSL indicates Value of Statistical Life. VSLY indicates Value of Statistical Life Year. ES indicates Executive Summary. Item Number indicates the identification number used for a variable in the logit analysis.

Missing RIAs

The largest online collection of regulatory impact analyses is the RIA Database located on the AEI-Brookings Joint Center website, www.aei-brookings.org. All of the RIAs used in this study are on the website. There are four RIAs that are on the website that are not used in this study. A list of these RIAs and the reason for not including them is below.

RIN	Title	Date of RIA	Reason for Exclusion
2050-AA21	EPA: Hazardous Waste Management System; Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, 47 FR 33274	1982	We were only able to locate the <i>Federal Register</i> notice, not the actual RIA.
2040-AB24	EPA: Drinking Water; National Primary Drinking Water Regulations; Filtration, Disinfection; Turbidity, Giardia lamblia, Viruses, Legionella, and Heterotrophic Bacteria, 54 FR 27486	1989	We were only able to locate the <i>Federal Register</i> notice, not the actual RIA.
2060-AC68	EPA: National Emission Standards for Hazardous Air Pollutants, 54 FR 38083	1989	This RIA has many missing pages.
2040-AB56	EPA: Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants; States' Compliance, 57 FR 60848	1992	We were only able to locate the <i>Federal Register</i> notice, not the actual RIA.

Note on Methodology

The scorecard for the study is based on the scorecard from Hahn et al. (2000). About one third of the questions from Hahn et al. (2000) were eliminated in order to focus on those areas that had produced the most meaningful results in the earlier paper. Some new questions were added and the wording of a few questions was changed. For example, Hahn et al. (2000) uses the term “best estimate,” but we decided “point estimate” was more appropriate. We included point estimates even if the RIA did not indicate whether the point was the best estimate or not. Most RIAs seemed to be giving a best estimate, but the distinction was not always made.

Scoring of the RIAs for Reagan and Bush involved a primary scorer and a second individual who validated the findings of the first scorer. All primary scorers had at least a bachelor’s degree in economics. The primary scorer used the RIA to evaluate each item on the scorecard. The second researcher validated the first researcher’s findings by reviewing the RIA and the completed scorecard. If the findings of the two researchers differed for any part of the scorecard, the researchers resolved the differences by discussion. Differences were generally rare because the questions are straightforward.

A similar approach was used for Clinton RIAs that had been scored in a previous study. In this case, a researcher would complete a scorecard based on the RIA and use the scorecard from Hahn et al. (2000) as a check.

Appendix

We performed a formal statistical analysis of the data and confirmed that there was not much evidence of a change in RIA quality, measured as scores on our scorecard, across administration or time. There is also great deal of variation in the quality of individual cost-benefit analyses.

A. Trends in Quality

According to our measures of quality, there has been no significant time trend and no presidential administration is clearly better or worse than the other two. The intuition behind these results can be seen in the figures presented in the paper. Formal statistical tests support this conclusion. Specifically, we estimated several logit models where the dependent variable was the score received on a particular question and the independent variables included the cost of the rule and the originating office. Our control variables, including measures of time, generally were not significant under several different specifications. Table 5 summarizes the results from four of these specifications.

The dependent variable was the quality score (0 or 1) for each of a subset of questions for each of the RIAs. The questions used in the primary analysis are numbers 5-9, 11-13, 15-16, 32-33, 37-39, 42-49, 68-69, 71 and 73-74. See Table 4 for more details on the questions. We primarily used a logit model, but the results were not sensitive to the choice of logit or probit. The independent variables were the year, a measure of the cost of the regulation in millions of 2001 dollars, a dummy for which question was used, a dummy for each administration, and a dummy for each EPA office.

The dummy for each question was introduced to control for the fact that some questions are harder to answer than others. This is reflected in the fact that the mean score varies considerably by question. We also ran specifications with interactions between a fixed effect for the general category of the question (costs, benefits or other) and the other control variables. The time variables were not significant in these versions of the model.

The dummy for the office was aimed at determining whether some subjects might be easier for EPA to analyze than others. For example, air pollutants have generally been studied more extensively than hazards, so the air office might have an advantage when writing RIAs. Our results, however, do not really support this hypothesis. The dummy variables for originating office were generally not significant, although the water regulations consistently had the largest coefficient.

The cost variable is included as a measure of the size of the regulation. EPA may devote more resources to analyzing rules that are very costly because those rules are likely to receive more scrutiny and cause more controversy. Therefore, other things being equal, one might expect the average quality of an RIA to increase with the size of the regulation being studied. There is limited evidence to support this hypothesis since the coefficient on cost was significant or nearly significant in some specifications. However, as shown in Table 5, the estimated cost coefficient was not robust. The removal of one outlier that is twice as expensive as the next costliest regulation has a large effect, even when costs are expressed as logarithms.¹

The specification presented in Table 5 includes two time variables, year and administration, allowing us to pick up possible linear and nonlinear time trends. In no case were

¹ The outlier is the National Ambient Air Quality Standards for Particulate Matter, which has an annualized cost of \$8.6 billion.

these variables significant. This was also true for all the estimations not presented here. For example, the variables are still not significant if we only include year or only administration dummies. We also tried running each question separately, in order to test whether a time trend exists for some questions but not others. A few questions did have positive and significant time trends under this specification, including “RIA contains executive summary,” “Associates costs with Federal government,” and “Provided point estimate of total benefits.” This may be evidence of a positive time trend for at least a few questions, but it is fairly weak. Given that we are testing the coefficient on time in 28 separate estimations, we would expect a few false positives (i.e., type I errors). We conclude that there is no strong statistical evidence to suggest that the quality of RIAs is getting better or worse over time.

In all of the estimations, we used a clustered standard error to account for the fact that questions from the same RIA are not truly independent observations. This turns out to be an important decision. If we do not use clustered standard errors, time variables become significant in several specifications. However, questions from the same RIA are clearly related. For example, if a question quantified benefits, it is more likely to have estimated cost effectiveness because the latter requires quantified benefits. This means that the error term in the equation for the question “Quantified benefits” is correlated with the error term in “Calculated at least some measure of cost effectiveness” within the same RIA. This, in turn, means that clustered standard errors are more appropriate.

We conclude from this analysis that there is no significant time trend in the quality of RIAs, nor has any administration performed significantly better than the others. Given the evidence presented by the figures in the paper, this was expected. Somewhat surprising is the finding that the other control variables, cost of the regulation and originating office, were generally not significant either. This may support our belief, discussed in the paper, that relatively static institutional factors are a major factor in RIA quality.

B. Variation in Quality

The scores of RIAs in our data vary considerably, even within administrations. To examine this issue, we constructed two indices consisting of various dimensions on which rules were scored. The index score for each RIA was defined as the percentage of questions on which the RIA received a positive score.

First, we considered an index, Index 1, that only included those questions included in the logit estimation described above. For the Reagan administration, the lowest score was 25 percent, the mean was 55 percent and the highest score was 86 percent. For the Bush administration, the lowest score was 14 percent, the mean was 56 percent and the highest score was 89 percent. For the Clinton administration, the lowest score was 32 percent, the mean was 56 percent and the highest score was 93 percent. The standard deviation of scores for Reagan-era rules (n=27) was 18%, the standard deviation for George H.W. Bush rules (n=24) was 22%, and the standard deviation for Clinton rules (n=23) was 21%. A Levene test of equal variances showed that we could not reject the hypothesis that the scores across administrations have equal variances. Figure 1 illustrates Index 1 over time graphically.

Second, we considered a more restrictive index, Index 2, that included only six questions, those which we thought were particularly important for determining the economic efficiency of a regulation. We considered whether the RIA provided 1) a point estimate of total monetized costs; 2) a range for total monetized costs; 3) a point estimate of total monetized benefits; 4) a range for

total monetized benefits; 5) a point estimate of total net benefits; and 6) a range for total net benefits. The Reagan and Bush administrations were very similar. For the Reagan administration, the lowest score was zero percent, the mean was 26 percent and the highest score was 83 percent. For the Bush administration, the lowest score was zero percent, the mean was 29 percent and the highest score was 83 percent. For the Clinton administration, the scores were more tightly clustered, with the lowest score at 17 percent, a mean of 35 percent and the highest score at 67 percent. Figure 2 illustrates Index 2 over time graphically.

We also performed ordinary least squares regressions on both the original index of quality measures and the more restrictive index to determine whether these indices were affected by time. The year coefficient is positive but never significant for the broader index while the Bush and Clinton administration dummies are negative and significant. For the more restrictive index, the coefficient on year is positive and significant at the 10% level for some specifications, but, the administration dummies remain negative.² Overall, these results suggest, but do not prove, a positive time trend for the more important quality measures.

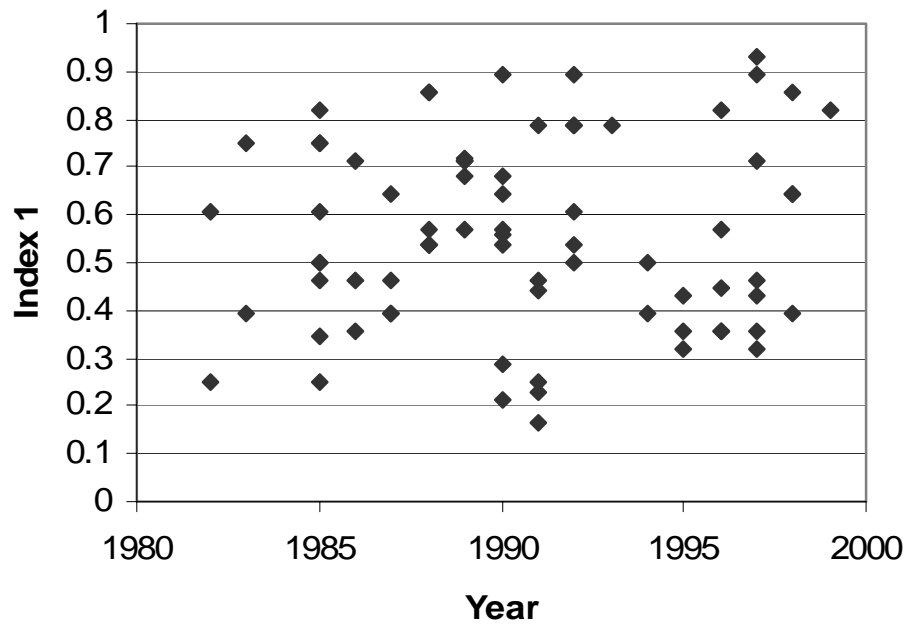
² The independent variables that we used in the OLS regression were the same as the ones we used in the logit estimation in table 1. The coefficient on the year variable was 0.03, with a p-value of 0.1. When we remove the outlier, the coefficient on year becomes 0.03, with a p-value of 0.07. With robust standard errors, the p-values are 0.11 and 0.08, respectively. The year coefficient is not significant if we use log of costs instead of costs.

Table 5: Logit Estimations for Quality of RIA

Variable	Estimation 1 Cost, Year (w/outlier)		Estimation 2 Cost, Year (no outlier)		Estimation 3 LogCost, Year (w/outlier)		Estimation 4 LogCost, Year (no outlier)	
	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
Year	.1	.2	.11	.16	.098	.21	.099	.22
Cost (2001 \$M)	.00015	.11	.000016	.90				
Log of Cost					.22	.30	.12	.57
Bush	-.41	.36	-.50	.27	-.36	.45	-.38	.42
Clinton	-1.04	.22	-1.25	.16	-.88	.33	-.99	.28
EPAair	.09	.75	.13	.66	-.02	.94	.007	.98
EPAwater	.31	.42	.30	.43	.22	.06	.23	.56
EPAtoxics	-.075	.81	-.12	.71	-.11	.72	-.14	.67
Log likelihood	-1166		-1156		-1133		-1120	
Observations	2072		2044		2016		1988	
Pseudo R2	.1810		.1783		.1820		.18	
Wald Chi2	666		687		647		629	

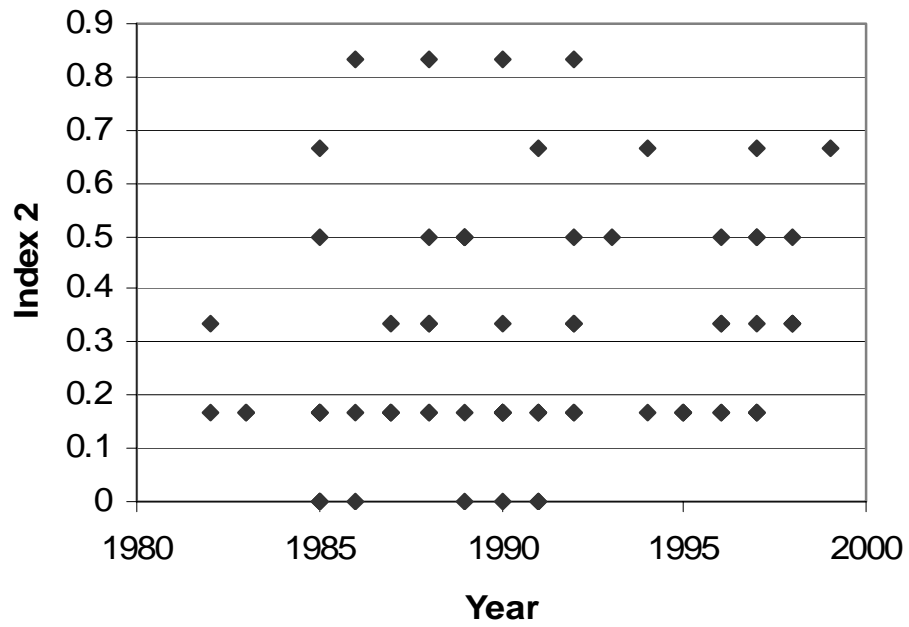
Notes: See text for more details. The dependent variable is 1 if the RIA contains the particular quality measure, 0 if not. The sample consists of 74 RIAs that span the Reagan, Bush I and Clinton administration from 1982 to 1999. We considered 28 quality measures, each of which had a fixed effect in the estimation that is not shown here. Two regulations, the New Source Performance Standard for New Residential Wood Heaters and the Financial Assurance Mechanisms for Local Government Owners and Operators of Municipal Solid Waste Landfills, had negative net costs. Since the logarithm of a negative number is undefined, these observations were dropped in the specifications involving the logarithm of cost.

Figure 1: Index 1 across Time



Note: Index 1 represents one measure of quality. It is composed of 28 questions (5-9, 11-13, 15-16, 32-33, 37-39, 42-49, 68-69, 71 and 73-74) and ranges from 0 to 1. See Table 4 for a list of the questions.

Figure 2: Index 2 across Time



Note: Index 2 represents one measure of quality. It is composed of six questions (5-6, 15-16, and 25-26) and ranges from 0 to 1. See Table 4 for a list of the questions.

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