

lacking to carry out a formal probabilistic simulation. Sensitivity analysis can be used to find “switch points”—critical parameter values at which estimated net benefits change sign or the low cost alternative switches. Sensitivity analysis usually proceeds by changing one variable or assumption at a time, but it can also be done by varying a combination of variables simultaneously to learn more about the robustness of your results to widespread changes. Again, however, major rules above the \$1 billion threshold require a formal treatment.

- Apply a formal probabilistic analysis of the relevant uncertainties—possibly using simulation models and/or expert judgment as revealed, for example, through Delphi methods. Such a formal analytical approach is appropriate for complex rules where there are large multiple uncertainties whose analysis raises technical challenges, or where the effects cascade, and it is required for rules that exceed the \$1 billion threshold. For example, in the analysis of regulations addressing air pollution, there is uncertainty about the effects of the rule on future emissions, uncertainty about how the change in emissions will affect air quality, uncertainty about how changes in air quality will affect health, and finally uncertainty about the economic and social value of the change in health outcomes. You should make a special effort to portray the probabilistic results—in graphs and/or tables—clearly and meaningfully.

- New methods may become available in the future. This document is not intended to discourage or inhibit their use, but rather to encourage and stimulate their development.

2. Assigning Economic Values to Uncertain Outcomes

Uncertainty affects the values that you assign to the costs and benefits of regulatory actions. Because the outcome of regulatory action is not certain, but is instead best represented by a probability distribution of potential outcomes, the value assigned to the expected outcome from this probability distribution may be different from that for an expected outcome of the same magnitude that is certain to occur. In the financial world, for example, riskier instruments must generally earn a higher rate of return, and investors receive a higher expected reward for bearing uncertainty. This principle can carry over to the analysis of regulations depending on who bears the uncertainties from regulatory decisions.

When reporting benefit and cost estimates, where there is a distribution of outcomes, you will often find it useful to emphasize summary statistics or figures that can be readily understood and compared to achieve the broadest public understanding of your findings. It is a common practice to compare the “best estimates” of both benefits and costs with those of competing alternatives. These “best estimates” are usually the average or the expected value of benefits and costs. Emphasis on these expected values is appropriate as long as society is “risk neutral” with respect to the regulatory alternatives. This, however, may not always be the case. For a risk-averse individual, the certainty equivalent of an uncertain net

benefit stream is less than its expected cash value, because the uncertainty itself is valued negatively.

E. Other Key Considerations

1. Other Cost Considerations

You should include these effects in your analysis and provide estimates of their monetary values wherever possible.

- Private-sector compliance costs;
- Government administrative costs;
- Losses in consumers’ or producers’ surpluses;
- Discomfort or inconvenience; and
- Loss of time.

Estimates of costs should be based on credible changes in technology over time. For example, a slowing in the rate of innovation or of adoption of new technology because of delays in the regulatory approval process or the setting of more stringent standards for new facilities than existing ones may entail significant costs. On the other hand, a shift to regulatory performance standards and incentive-based policies may lead to cost-saving innovations that should be taken into account. The weight you give to a study of past rates of cost savings resulting from innovation (including “learning curve” effects) should depend on both their timeliness and their direct relevance to the processes affected by the regulatory alternative under consideration. In some cases agencies are limited under statute to considering only technologies that have been demonstrated to be feasible. In these situations, it may also be useful to estimate costs and cost savings assuming a wider range of technical possibilities.

Occasionally, one or more components of the analysis address cost savings to one of the parties directly affected by the rule. For example, a requirement that manufacturers reduce emissions from engines they produce may lead to technologies that improve fuel economy. These fuel savings will normally accrue to the purchasers of the engines. There is no apparent market failure with regard to the market value of fuel saved because one would expect that consumers would be willing to pay for increased fuel economy that exceeded the cost of providing it. When these cost savings are substantial, and particularly when you estimate them to be greater than the cost associated with achieving them, it is incumbent on you to demonstrate convincingly why the market has not already captured these gains. As a general matter, any costs that are averted as a result of an alternative should be monetized wherever possible and either added to the benefits or subtracted from the costs of that alternative.

2. The Difference Between Costs (or Benefits) and Transfer Payments

Distinguishing between real costs and transfer payments is an important, but sometimes difficult, problem in cost estimation. Cost and benefit estimates should reflect real resource use. Transfer payments are monetary payments from one group to another that do not affect total resources available to society. For example, a regulation that restricts the supply of a good, causing its price to rise, produces a transfer

of income from buyers to sellers. The reduction in the total value of the supply of the good is a real cost to society, but the transfer of income from buyers to sellers resulting from the higher price is not. You should not include transfers in the estimates of the benefits and costs of a regulation.²³ Instead, address them in a separate discussion of the regulation’s distributional effects.

Examples of transfer payments include the following:

- Scarcity rents and monopoly profits.
- Insurance payments.
- Indirect taxes and subsidies.
- Distribution expenses.

3. Alternative Assumptions

If benefit or cost estimates depend heavily on certain assumptions, you should make those assumptions explicit and carry out sensitivity analyses using plausible alternative assumptions. If the value of net benefits changes from positive to negative (or vice versa) or if the relative ranking of regulatory options changes with alternative plausible assumptions, you should conduct further analysis to determine which of the alternative assumptions is more appropriate. Because different estimation methods may have hidden assumptions, you should analyze estimation methods carefully to make any hidden assumptions explicit.

V. Specialized Analytical Requirements

In preparing analytical support for your rulemaking, you should be aware that there are a variety of analytic requirements imposed by law and Executive order. In addition to the regulatory impact analysis requirements of E.O. 12866, you should also consider whether your rule will need specialized analysis of any of the following issues.

A. Impact on Small Businesses and Other Small Entities

Under the Regulatory Flexibility Act (5 U.S.C. chapter 6), agencies must prepare a proposed and final “regulatory flexibility analysis” (RFA) if the rulemaking could “have a significant impact on a substantial number of small entities.” Your agency should have guidelines on how to prepare an RFA and you are encouraged to consult with the Chief Counsel for Advocacy of the Small Business Administration on expectations concerning what is an adequate RFA. Executive Order 13272 (67 FR 53461, August 16, 2002) requires you to notify the Chief Counsel for Advocacy of any draft rules that might have a significant economic impact on a substantial number of small entities. E.O. 13272 also directs agencies to give every appropriate consideration to any comments provided by the Advocacy Office.

B. Analysis of Unfunded Mandates

Under the Unfunded Mandates Act (2 U.S.C. 1532), you must prepare a written statement about costs and benefits prior to issuing a proposed or final rule (for which

²³ However, transfers from the United States to other nations should be included as costs, and transfers from other nations to the United States as benefits.