REGULATORY PROGRAM OF THE UNITED STATES GOVERNMENT

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APPENDIX V

Regulatory Impact Analysis Guidance

A Regulatory Impact Analysis (RIA) should demonstrate that a proposed regulatory action satisfies the requirements of Section 2 of Executive Order No. 12291. To do so, it should show that:

- There is adequate information concerning the need for and consequences of the proposed action;
- The potential benefits to society outweigh the potential costs; and
- Of all the alternative approaches to the given regulatory objective, the proposed action will maximize net benefits to society.

The fundamental test of a satisfactory RIA is whether it enables independent reviewers to make an informed judgment that the objectives of Executive Order No. 12291 are satisfied. An RIA that includes all the elements described below is likely to fulfill this requirement. Although variations consistent with the spirit and intent of the Executive Order may be warranted for some rules, most RIAs should include these elements.

The guidance in this document is not in the form of a mechanistic blueprint, for a good RIA cannot be written according to a formula. Competent professional judgment is indispensable for the preparation of a high-quality analysis. Different regulations may call for very different emphases in analysis. For one proposed regulation, the crucial issue may be the question of whether a market failure exists, and much of the analysis may need to be devoted to that key question. In another case, the existence of a market failure may be obvious from the outset, but extensive analysis might be necessary to estimate the magnitude of benefits to be expected from proposed regulatory alternatives. The amount of analysis (whether scientific, statistical, or economic) that a particular issue requires depends on how crucial that issue is to determine the best alternative and on the complexity of the issue.

Regulatory analysis inevitably involves uncertainties and requires informed professional judgments. Whenever an agency has questions about such issues as the appropriate analytical techniques to use or the alternatives that should be considered, it should consult with the Office of Management and Budget as early in the analysis stage as possible.

This document is written primarily in terms of proposed regulatory changes. However, it is equally applicable to the review of existing regulations. In the latter case, the regulation under review should be compared to a baseline case of no regulation and to reasonable alternatives.

Elements of a Regulatory Impact Analysis

Preliminary and final Regulatory Impact Analyses of major rules should contain five elements. They are: (1) a statement of the potential need for the proposal, (2) an examination of alternative approaches, (3) an analysis of benefits and costs, (4) the rationale for choosing the proposed regulatory action, and (5) a statement of statutory authority. These elements are explained in Sections I–V below.

I. STATEMENT OF POTENTIAL NEED FOR THE PROPOSAL

In order to establish the potential need for the proposal, the analysis should demonstrate that (a) market failure exists that is (b) not adequately resolved by measures other than Federal regulation.

A. Market Failure

The analysis should determine whether there exists a market failure that is likely to be significant. Once such market failure has been identified, the analysis should show how adequately the regulatory alternatives to be considered address the specified market failure. The three major types of market failure are externality, natural monopoly, and inadequate information.

1. *Externality.* An externality occurs when one party's actions impose uncompensated benefits or costs on another outside the marketplace. Environmental problems are a classic case of externality. Another example is the case of common property resources that may become congested or overused, such as fisheries or the broadcast spectrum. A third example is a "public good," such as defense or scientific research, whose distinguishing characteristic is that it is inefficient, or impossible, to exclude individuals from its benefits.

2. *Natural monopoly.* Natural monopoly exists where a market can be served at lowest cost only if production is limited to a single producer. Local telephone, gas, and electricity services are examples.

3. *Inadequate information.* The optimum, or ideal, level of information is not necessarily the maximum possible amount, because information, like other goods, should not be produced when the costs of doing so exceed the benefits. The free market does not

necessarily supply an optimal level of information, because information, once generated, can be disseminated at little or no marginal cost, and because it is commonly infeasible to exclude nonpayers from reaping benefits from the provision of information by others. Where market failure due to inadequate information is the rationale for government intervention, a regulatory action to improve the availability of information will ordinarily be the preferred alternative.

The current state of knowledge about the economics of information is not highly developed. Therefore, regulatory intervention to address an information problem should only be undertaken where there is substantial reason to believe that private incentives to provide information are seriously inadequate and that the specific regulatory intervention proposed will provide net benefits for society.

In many circumstances, the availability of information, while perhaps not optimal, is reasonably adequate, so that attempts to regulate information are as likely to make things worse as to make them better. Information about a particular characteristic of a product, for example, would be reasonably adequate if buyers could determine the existence of the characteristic by inspection of the product before purchase or (in the case of a frequently purchased product) by use of the product. Even if the characteristic could not be determined by buyers, government intervention would not be warranted where sellers have incentives to reveal the existence of the characteristic to buyers. Sellers will have substantial incentives to supply information about any characteristic that is important to buyers and valued positively by them, particularly if the level of the characteristic varies between the products of one seller and another. In these circumstances, sellers whose products rank highly in the valued characteristic can increase their sales by informing buyers of the superiority of their products. If the level of the characteristic does not vary between the products of one seller and another, individual sellers have less incentive to inform buyers about the characteristic. Even so, the incentives of individual sellers or of a trade association to supply information may be substantial.

Sellers are least likely to supply adequate information about a particular characteristic of their product where the characteristic is negatively valued by consumers and the level of the characterstic does not vary between the products of one seller and those of another (e.g., cholesterol in eggs). Even in such circumstances, substantial information about the characteristic may be available to buyers. For example, sellers of rival products may supply the information (e.g., while sellers of butter may have no incentive to tell buyers about cholesterol in butter and its possible consequences, sellers of margarine do have such an incentive). Where the negative characteristic involves a health or safety hazard, the threat of future product liability lawsuits may give sellers adequate incentives to reveal information about the potential hazard. News media, consumer groups, public health agencies, and similar services may supply information not supplied by sellers. In summary, while it is possible to identify situations in which market failure due to inadequate information is more likely to warrant regulatory intervention, each situation must be examined on a case-by-case basis.

There should be a presumption against the need for certain types of regulatory actions, except in special circumstances. A particularly demanding burden of proof is required to demonstrate the potential need for any of the following types of regulations:

- Price controls in competitive markets
- Controls on production or sales in competitive markets
- Mandatory uniform quality standards for goods or services, unless they have hidden safety or other defects and the problem cannot be adequately dealt with by voluntary standards or information disclosing the hazard to potential buyers or users
- Controls on entry into employment or production, except (a) where indispensable to protect health and safety (e.g., FAA tests for commercial pilots) or (b) to manage the use of common property resources (e.g., fisheries, airwaves, Federal lands, and offshore areas).

B. Alternatives to Federal Regulation

Even where a market failure exists, there may be no need for Federal regulatory intervention if other means of dealing with the market failure resolve the problem adequately or better than the proposed Federal regulation would. Among the alternative means that may be applicable are the judicial system (particularly liability cases to deal with health and safety), antitrust enforcement, and workers' compensation systems.

An important alternative that may often be relevant is regulation at the State or local level. In determining whether there exists a potential need for a proposed Federal regulation, the analysis should examine whether regulation at the Federal level is more appropriate than regulation at the State or local level. This analysis may support regulation at the Federal level where rights of national citizenship (such as legal equality among the races) or considerations of interstate commerce are involved. If interstate commerce is involved the analysis should attempt to determine whether the burdens on

state commerce arising from different State and regulations are so great that they outweigh the ntages of diversity and local political choice. In cases, the nature of the market failure may suggest the most appropriate governmental of regulation. For example, pollution that spills ss state lines (such as acid rain whose precursors ransported widely in the atmosphere) is probably controlled by Federal regulation, while localized ution (such as garbage truck noise) is probably e efficiently handled by local government regula-

general, because demands among localities for rent governmental services differ and because petition among governmental units for taxpayers citizens may encourage efficient regulation, the llest unit of government capable of correcting the ket failure should be chosen. This must, however, balanced against the possibility of higher costs use national firms would be required to comply more than one set of regulations and because inistering similar regulations in more than one rnmental unit involves some costs of duplication. s, some analysis may be necessary to determine ch level of government can most efficiently regu- a specific market failure.

the analysis does suggest a potential need for a eral action, it should also consider alternatives of regulatory Federal measures. For example, as an rnative to requiring an action or the use of a ticular product, it may be more efficient to subsi- it. Similarly, a fee or charge may be a preferable rnative to banning or restricting a product or on. An example would be an effluent discharge which has been recommended as an efficient way imit pollution, because it causes pollution sources h different marginal costs of abatement to control uents in an efficient manner. In addition, legisla- measures that make use of economic incentives, h as changes in insurance provisions or changes in perty rights, should be considered.

AN EXAMINATION OF ALTERNATIVE APPROACHES

he RIA should show that the agency has consid- d the most important alternative approaches to problem and must provide the agency's reasoning selecting the proposed regulatory change over h alternatives. Ordinarily, it will be possible to minate some alternatives by a preliminary analy- *leaving a manageable number* of alternatives to evaluated by quantitative benefit-cost analysis ording to the principles to be described in Section The number and choice of alternatives to be selected for detailed benefit-cost analysis is unavoidably a matter of judgment. There must be some balance between thoroughness of analysis and practical limits to the agency's capacity to carry out analysis.

Alternative regulatory actions that should be explored include the following:

1. *More performance-oriented standards for health, safety, and environmental regulations.* Performance standards are generally to be preferred to engineering or design standards because they allow the regulated parties to achieve the regulatory objective in the most cost-effective way. In general, a performance standard should be preferred wherever that performance can be measured or reasonably imputed. Performance standards should also be applied as broadly as possible without creating too much variation in regulatory benefits; for example, by setting emission standards on a plant-wide or firm-wide basis rather than source by source. It is misleading and inappropriate, however, to characterize a standard as a performance standard if it is set so that there is only one feasible way to meet it; as a practical matter, such a standard is a design standard.

2. *Different requirements for different segments of the regulated population.* For example, there might be different requirements for large and small firms. If such a differentiation is made, it should be based on perceptible differences in the costs of compliance or in the benefits to be expected from compliance. For example, some worker safety measures may exhibit economies of scale, that is, lower costs per worker protected in large firms than in small firms. A heavier burden should not be placed on one segment of the regulated population on the grounds that it is better able to afford the higher cost; this is a sure formula for loading disproportionate costs on the most productive sectors of the economy.

3. *Alternative levels of stringency.* In general, both the benefits and costs associated with a regulation will increase with the level of stringency (although costs will eventually increase more rapidly than benefits). It is important to consider alternative levels of stringency to better understand the relationship between stringency and benefits and costs. This approach will increase the information available to the decisionmaker on the option that maximizes net benefits.

4. *Alternative effective dates of compliance.* The timing of a regulation may also have an important effect on its net benefits. For example, costs of a regulation may vary substantially over different compliance dates for an industry that requires a year or more to plan its production runs efficiently. In this instance, a regulation whose requirements provide

sufficient lead time is likely to achieve its goals at a much lower overall cost than a regulation that is effective immediately.

5. *Alternative methods of ensuring compliance.* Compliance alternatives include the appropriate entity (local, State, or Federal) enforcing compliance, whether compliance is enforced by on-site inspection or periodic reporting, and structuring compliance penalties so that they provide the most appropriate incentives.

6. *Informational measures.* Measures to improve the availability of information include government establishment of a standardized testing and rating system (the use of which could be made mandatory or left voluntary), mandatory disclosure requirements (e.g., by advertising, labeling, or enclosures), and government provision of information (e.g., by government publications, telephone hot-lines, or public interest broadcast announcements). If intervention is necessary to address a market failure arising from inadequate information, informational remedies will generally be the preferred approaches. As an alternative to a mandatory standard, a regulatory measure to improve the availability of information has the advantage of being a more market-oriented approach. Thus, providing consumers information about concealed characteristics of consumer products gives consumers a greater choice than banning these products (for example, consumers are likely to benefit more from information on energy efficiency than from a prohibition on sale of appliances or automobiles falling below a specified standard of energy efficiency).

Except for prohibiting indisputably false statements (whose banning can be presumed beneficial), specific informational measures must be evaluated in terms of their benefits and costs. Paradoxically, the current state of knowledge does not generally permit the benefits and costs of informational remedies to be measured very accurately. Nonetheless, it is essential to consider carefully the costs and benefits of alternative informational measures, even if they cannot be quantified very precisely. Some effects of informational measures can easily be overlooked. For example, the costs of a mandatory disclosure requirement for a consumer product include not only the obvious cost of gathering and communicating the required information, but also the loss of any net benefits of information displaced by the mandated information, the cost of any inaccurate consumer interpretation of the mandated information, and any inefficiencies arising from the incentive that mandatory disclosure of a particular characteristic gives to producers to overinvest in improving that specific characteristic of their products.

Where information on the benefits and costs of alternative informational measures is insufficient to provide a clear choice between them, as will often be the case, the least intrusive alternative, sufficient to accomplish the regulatory objective, should be chosen. For example, it will often be sufficient for government to establish a standardized testing and rating system without mandating its use, because firms that score well according to the system will have ample incentive to publicize the fact.

7. *More market-oriented approaches.* In general, alternatives that provide for more market-oriented approaches, with the use of economic incentives replacing command-and-control requirements, should be explored. Market-oriented alternatives that may be considered include fees, subsidies, penalties, marketable rights or offsets, changes in liabilities or property rights, and required bonds, insurance or warranties (in many instances, implementing these alternatives will require legislation).

III. ANALYSIS OF BENEFITS AND COSTS

A. General Principles

The preliminary analysis called for by Sections I and II should have narrowed the number of alternatives to be considered by quantitative benefit-cost analysis to a workable number. Ordinarily, one of the alternatives will be to promulgate no regulation at all, and this alternative will commonly serve as the base from which increments in benefits and costs are calculated for the other alternatives. Even if alternatives such as no regulation are not permissible statutorily, it is often desirable to evaluate the benefits and costs of such alternatives to determine if statutory change would be desirable. Departments and agencies bear a similar burden when they perform environmental impact statements in which alternatives that lie outside their statutory authority must be considered.

In some cases, the desirability of specific alternatives outside the scope of the agency's regulatory authority may be determined by use of basic economic concepts in light of the principles enumerated in Section I. In other instances, however, only a quantitative benefit-cost analysis can resolve the question, and such alternatives will need to be included in the analysis of this section. In addition, alternative forms of agency regulation will need to be evaluated by quantitative benefit-cost analysis.

1. *Evaluation of Alternatives.* Except where prohibited by law, the primary criterion for choice among alternatives is expected net benefit (benefits minus costs). Other criteria may sometimes produce equivalent results, but they must be used with care to avoid

the potentially serious pitfalls to be explained in Part B of this section and in Section IV. Both benefits and costs should be expressed in discounted constant dollars. Appropriate discounting procedures are discussed in the following section.

The distinction between benefits and costs in benefit-cost analysis is somewhat arbitrary, since a positive benefit may be considered a negative cost, and vice versa, without affecting the net benefit (benefits minus costs) decision criterion. This implies that the considerations applicable to benefit estimates also apply to costs and vice versa. The different issues are considered separately under benefits or costs in Sections B and C below according to where they most often arise.

If the proposed regulation is composed of a number of distinct provisions, it is important to evaluate the benefits and costs of the different provisions separately. The interaction effects between separate provisions (such that the existence of one provision affects the benefits or costs arising from another provision) may complicate the analysis but does not eliminate the need to examine provisions separately. In such a case, the desirability of a specific provision may be appraised by determining the net benefits of the proposed regulation with and without the provision in question. Where the number of provisions is large and interaction effects are pervasive, it is obviously impractical to analyze all possible combinations of provisions in this way. Some judgment must be used to select the most significant or suspect provisions for such analysis.

2. *Discounting.* The monetary values of benefits and costs occurring in different years should be discounted to their present values so that they are comparable. This is not the same as correcting for inflation. An inflation adjustment is made with a price index, whereas discounting to present value is done with a discount rate. Benefits and costs expressed in constant (i.e., unaffected by inflation) dollars must further be discounted to present values before benefits and costs in different years can be added together to determine overall net benefits. As an equivalent alternative to discounting nonmonetized benefits, the RIA may use the discount rate to annualize (amortize) costs over a period that corresponds to the occurrence of the benefits. Regardless of the discounting procedure selected, the RIA must contain a schedule indicating when the benefits and costs occur.

Discounting takes account of the fact that resources (goods or services) in a given year are worth more than identical resources in a later year. The underlying reason for this is that resources can be invested so as to return more resources later. Partly because of this productivity of investment, individuals value consumption in earlier years higher than consumption in later years.

Modern analysis of discounting for public programs stresses the distinction between two rates of return:

- The *before-tax* rate, also known as the opportunity cost of capital. This is the real rate of return to marginal private investments. Estimates of the opportunity cost of capital in the U.S. economy vary substantially. The 10 percent discount rate specified by OMB Circular A–94 for use in evaluating government programs is intended to represent the opportunity cost of capital.
- The *after-tax* rate, also known as the consumption rate of interest. This represents the rate at which consumers would be willing to exchange present for future consumption, that is, the rate at which consumers must be compensated for postponing their consumption. As with the opportunity cost of capital, alternative estimates of the consumption rate of interest vary significantly. A rate of 4 percent is reasonably representative of the range of alternative estimates and consistent with a 10 percent before-tax rate of return.

The basic concept underlying the academic literature on public-sector discounting is that economic welfare is ultimately determined by consumption and only indirectly by investment. Therefore, the value of investment must be measured by the value of the subsequent increase in consumption it permits. Any effect that a government program has on investment must be converted to an equivalent time-stream of consumption before being discounted. In practice, this results in a complex procedure that uses the before-tax and after-tax discount rates, a "shadow price of capital," and the impacts of benefits and costs on investment. It is recommended that agencies continue to use the well-understood procedure of discounting by a single rate (as specified by OMB Circular A–94) and, when appropriate, perform additional analysis using the more complex shadow-price-of-capital methodology.

There are two circumstances when it is important to perform sensitivity analysis using the shadow price of capital approach:

(a) Where the costs of the regulation are almost entirely current costs borne by consumers. In such circumstances, a low rate close to 4 percent is called for. (This assumes, as is normally the case, that the benefits are all in the form of disposable income or other benefits directly to individuals.)

(b) Where some of the costs are capital costs financed out of saving *and* there is a long period between the time when most costs are incurred and the time when most benefits accrue. In general, the

smaller the fraction of costs that are capital costs financed out of saving and the *longer* the time period between costs and benefits, the greater the likelihood that the shadow price of capital approach will be correct.

It is conceptually incorrect to adjust the discount rate as a device to account for the uncertainty of expected future benefits and costs. This procedure will virtually never lead to a correct adjustment of benefits and costs. Therefore, risk and uncertainty should be dealt with according to the principles in Section 3 below and not by changing the discount rate.

3. *Treatment of Risk and Uncertainty.* Where uncertainties exist about important parameters affecting the expected benefits or costs of an alternative under consideration, it is essential to carry out a *sensitivity analysis* to determine the effect on net benefits of plausible variations in the value of the parameters. One form of sensitivity analysis involves calculation of the "switch-point" value of the parameter under examination, that is, the value of the parameter at the break-even point at which the net-benefit decision criterion switches over from favoring one alternative to favoring another. When this break-even point of the parameter value is determined, the analysis may then consider the probability that the true parameter value is above or below the break-even value. For example, if the major uncertainty about a proposed regulation were its cost, the analysis could calculate how high the cost would need to be in order to reduce the net benefit of the proposal to zero. If it is judged to be highly unlikely that the actual cost would be that high or higher, it may be concluded that the choice of the proposed alternative is not sensitive to uncertainties about its cost.

A primary objective of sensitivity analysis is to identify where additional analysis may be most needed. If the choice of a specific regulatory action is sensitive to alternative parameter values that are about equally likely to be true, more research to better determine the true parameter value could be very valuable.

Wherever parameter estimates are uncertain, for either benefits or costs, expected-value estimates should be presented. Hypothetical best-case or worst-case estimates may be presented as alternatives for sensitivity analysis. Where possible, information about the probability distribution of the parameter estimate should be presented.

A common situation that arises in estimating both benefits and costs is that a number of different studies may exist which together provide a range of different estimates for a particular parameter. In general, it is not appropriate to use the midpoint of the range of extreme values provided by the studies. Such a technique ignores the information provided by all studies except those providing the extreme values, which may be the least reliable. The preferred approach to deriving an expected-value estimate of a particular parameter in this situation would be to derive it as a weighted average of the estimates of the individual studies, with the weight of each estimate being based on the reliability (in the best judgment of the agency) of the study that produced it.

Where expected future benefits or costs are uncertain, their value to those who receive them may be different from their value if they were certain. (Often, but not always, a certain future benefit is worth more to people than an uncertain future benefit with the same expected value.) As noted in the previous section, it is incorrect to adjust the discount rate as a device to account for the riskiness of future benefits or costs. Any allowance for risk should be made by adjusting the monetary values (for the year in which they occur) of the uncertain benefits and costs so that they are expressed in terms of their "certainty-equivalents."

For an uncertain benefit in future year X, the certainty-equivalent is the number of certain dollars in year X that the uncertain benefit is worth to its recipient. For example, suppose that a particular regulation reduces the probability of fire in a particular type of facility. As part of a benefit-cost analysis for this regulation, the dollar value of the expected reduction in fire loss would be calculated. The owners of the protected facilities place a higher dollar value on the risk of a fire than the expected dollar value of the loss. This is demonstrated by their willingness-to-pay for fire insurance. Therefore, their relative net cost (the percentage difference between insurance premiums and insurance company claim payments) for fire insurance can be used to increase the expected dollar value of the reduction in fire loss to its certainty-equivalent value.

In the example of the preceding paragraph, the adjustment for risk would involve an increase in the value of the benefit, whereas uncertainty of a benefit is normally thought to reduce its certainty-equivalent value. The reason is that even though this benefit by itself is uncertain, it acts to reduce the overall level of risk that would prevail in the absence of the regulation. This illustrates the important principle that what matters is not the variability or riskiness of a regulation's net benefits by themselves but the regulation's effect on risk and uncertainty overall.

While an adjustment to account for risk may be called for in the fire-risk example given, a similar adjustment for the value of reductions in fatalities and injuries would not be appropriate. Assuming that

the values of fatalities and injuries have been derived by the willingness-to-pay methodology recommended in Section B.2 below, they would already represent the certainty-equivalent value of the uncertain risk. This is because the estimated dollar values represent the certain dollar amounts that individuals would sacrifice to reduce these risks.

Probably, in most cases, it will not be advisable to adjust for risk and uncertainty. As a theoretical matter, no adjustment for risk is necessary wherever the net benefits are widely dispersed among many individuals and are not correlated with disposable income. And in cases where this does not apply, risk may be relatively unimportant or may already be taken into account by use of the willingness-to-pay methodology. In other cases, there may be no practical way to quantify the value of changes in risk.

4. *Assumptions.* Where benefit or cost estimates are heavily dependent on certain assumptions, it is essential to make these assumptions explicit and, where alternative assumptions are plausible, to carry out sensitivity analyses based on plausible alternative assumptions. If the decision criterion proves to be sensitive to alternative plausible assumptions, this may necessitate further research to develop more evidence on which of the alternative assumptions is the most appropriate. Because the adoption of a particular estimation methodology sometimes implies major hidden assumptions, it is important to analyze estimation methodologies carefully to make hidden assumptions explicit.

5. *International Trade Effects.* In calculating the benefits and costs of a proposed regulatory action, generally no explicit distinction needs to be made between domestic and foreign resources. If, for example, compliance with a proposed regulation requires the purchase of specific equipment, the opportunity cost of that equipment is ordinarily best represented by its domestic cost in dollars, regardless of whether the equipment is produced domestically or imported. The relative value of domestic and foreign resources is correctly represented by their respective dollar values, as long as the foreign exchange value of the dollar is determined by a free exchange market. Nonetheless, an awareness of the role of international trade may be quite useful for assessing the benefits and costs of a proposed regulatory action. For example, the existence of foreign competition usually makes the demand curve facing a domestic industry more elastic than it would be otherwise. Elasticities of demand and supply frequently can significantly affect the magnitude of the benefits or costs of a regulation.

A regulation that discriminates unjustifiably against foreign exporters is a form of economic protectionism. The economic loss to the U.S. due to the fact that protectionism is economically inefficient will be reflected in the net benefit estimate of any properly conducted benefit-cost analysis. However, a benefit-cost analysis will generally not be able to measure the potential U.S. loss from the threat of future retaliation by foreign governments. Therefore, special attention should be given to any possibility that a regulation would unjustifiably discriminate between domestic and foreign producers and consumers—both discrimination against foreigners and discrimination in favor of foreigners.

The fact that a regulation has a differential effect on foreigners as compared to Americans does not necessarily constitute discrimination. If, for example, an automobile safety standard could be complied with less expensively by large cars than by small cars, such a standard would be more favorable to American car producers, who produce relatively more large cars compared to the fleet mix of foreign producers. Nonetheless, such a differential effect would not be discriminatory if the difference in compliance cost between large and small cars was necessary to achieve legitimate regulatory objectives in the most efficient way.

If a regulation has an adverse differential effect on foreign producers or consumers relative to domestic producers and consumers that is not necessary to realize regulatory goals efficiently, then a discriminatory effect on foreign trade exists. The RIA should identify any substantial differential effect on international trade and explain why it is necessary to achieve legitimate regulatory goals in the most efficient way. One means for reducing the likelihood of international discrimination would be for a U.S. product standard for an internationally traded good to be based on an international standard, wherever an international standard exists and is compatible with the health, safety, or environmental needs of the U.S. International harmonization can be beneficial for regulations directly setting standards for internationally traded goods or services. For example, it would be appropriate to consider international harmonization in setting safety standards for automobiles. There is no similar advantage to international harmonization where a regulation does not directly affect the quality of an internationally traded good or service, even if it indirectly affects its costs (e.g., environmental controls for automobile plants).

6. *Distributional Effects.* Those who bear the costs of a regulation and those who enjoy its benefits often are not the same persons. Benefits and costs of regulation may also be distributed unevenly over time, perhaps spanning several generations. There is no generally accepted way to monetize potential

distributional effects. Attempts to incorporate distributional concerns in benefit-cost analysis require the establishment of unequal weights for different groups in society. Because positive economics treats equally the willingness-to-pay of all individuals, any alternative weighting would undermine the objective character of the analysis. Policymakers may wish, however, to take account of the distributional effects of various regulatory alternatives. Therefore, where there are potentially important differences between those who stand to gain and those who stand to lose under alternative regulatory options, the RIA should identify these groups and indicate the nature of the differential effects. The RIA should also present information on the streams of benefits and costs over time as well as present value estimates, particularly where intergenerational effects are concerned.

B. Benefit Estimates

The RIA should state the beneficial effects of the proposed regulatory change and its principal alternatives. In each case, there should be an explanation of the mechanism by which the proposed action is expected to yield the anticipated benefits. An attempt should be made to quantify all potential real incremental benefits to society in monetary terms to the maximum extent possible. A schedule of monetized benefits should be included that would show the type of benefit and when it would accrue; the numbers in this table should be expressed in constant, undiscounted dollars. Any expected incremental benefits that cannot be monetized should be explained.

The RIA should identify and explain in detail the data or studies on which benefit estimates are based. Where benefit estimates are derived from a statistical study, the RIA must provide sufficient information so that an independent observer can determine the representativeness of the sample, whether it was extrapolated from properly in developing aggregate estimates, and whether the results are statistically significant.

For regulations addressing health and safety risks, the calculation of potential benefits should derive from the agency's estimate of the mean expected value of the reduction in risk attributable to the standard. Estimates of the prevailing level of risk and of the reduction in risk to be anticipated from a proposed standard should be unbiased expected-value estimates rather than hypothetical worst-case estimates. Extreme safety or health results should be weighted (along with intermediate results) by the probability of their occurrence to estimate the expected result implied by the available evidence. In addition, to the extent possible, the distribution of probabilities for various possible results should be presented separately, so as to allow for an explicit margin of safety, where required, in final decisions. If a margin of safety is to be provided, the proper place for it is the final stage of the decision-making process, not by adjusting the risk or benefit estimates in a conservative direction at the information-gathering or analytical stages of the process. Conservative estimates should be presented as alternatives to best estimates for sensitivity analysis but should not substitute for them.

It is important to guard against double-counting of benefits. For example, if a regulation improved the quality of the environment in a community, the value of real estate in the community might rise, reflecting the greater attractiveness of living in the improved environment. It would ordinarily be incorrect to include the rise in property values among the benefits of the regulation. Ordinarily, the value of environmental benefits (e.g., reduced health risks, scenic improvements) will already be included among the benefits. The rise in property values reflects the capitalized value of these improvements. Therefore, to count as benefits both the value of the environmental improvements and the corresponding increase in property values is to count the same benefits twice. Only where a direct estimate of the benefits has not been included would it be appropriate to include the increase in property values among the benefits.

1. *General Considerations.* The concept of "opportunity cost" is the appropriate construct for valuing both benfits and costs. The principle of "willingness-to-pay" captures the notion of opportunity cost by providing an aggregate measure of what individuals are willing to forgo so as to enjoy a particular benefit. Market transactions provide the richest database for estimating benefits based on willingness-to-pay, so long as the goods and services affected by a potential regulation are traded in markets. Estimation problems arise in a variety of instances, of course, where prices or market transactions are difficult to monitor. Markets may not even exist in some instances, forcing regulatory analysts to develop appropriate proxies that simulate market exchange. Indeed, the analytical process of deriving benefit estimates by simulating markets may suggest alternative regulatory strategies that create such markets.

Willingness to pay always provides the preferred measure of benefits. Estimates of willingness-to-pay based on observable and replicable behavior deserve the greatest level of confidence. Considerably less confidence should be conferred on benefit estimates that are neither derived from market transactions nor based on behavior that is observable or replicable. Of course, innovative benefit estimation method-

ologies may be necessary in some cases, and should be encouraged. However, reliance upon such methods intensifies the need for quality control to ensure that estimates derived conform as closely as possible to what would be observed if markets existed.

2. *Principles for Valuing Directly Observable Benefits.* Ordinarily, goods and services are to be valued at their market prices. However, in some instances, the market value of a good or service may not reflect its true value to society. If a regulatory alternative involves changes in such a good or service, its monetary value for purposes of benefit-cost analysis should be derived using an estimate of its true value to society (often called its "shadow price"). For example, suppose a particular air pollutant damages crops. One of the benefits of controlling that pollutant will be the value of the crop saved as a result of the controls. If the price of that crop is held above the free-market equilibrium price by a government price-support program it will overstate the value of the benefit of controlling the pollutant if the crop saved were valued at the market price established by the support program. The social value of the benefit should be calculated using a shadow price for crops subject to price supports. The estimated shadow price should reflect the value to society of marginal uses of the crop (e.g., the world price if the marginal use is for exports). If the marginal use is to add to very large surplus stockpiles, the shadow price would be the value of the last units released from storage minus storage cost. Therefore, where stockpiles are large and growing, the shadow price is likely to be low and could well be negative.

3. *Principles for Valuing Benefits that are Indirectly Traded in Markets.* In some important instances, a benefit corresponds to a good or service that is indirectly traded in the marketplace. Important examples include reductions in the health-and-safety risks, the use-value of environmental amenities and scenic vistas, and savings in time. To estimate the monetary value of such an indirectly traded good, the willingness-to-pay valuation methodology is still conceptually superior, because the amount that people are willing to pay for a good or service is the best measure of its value to them. As noted in Sections 4 and 5 immediately following, alternative methods may be used where there are practical obstacles to the accurate application of direct willingness-to-pay methodologies.

A variety of methods have been developed for estimating indirect benefits. Generally, these methods apply statistical techniques to distill from observable market transactions the portion of willingness-to-pay that can be attributed to the benefit in question. Examples include estimates of the value of environmental amenities derived from travel-cost studies, hedonic price models that measure differences or changes in the value of land, and statistical studies of occupational-risk premiums in wage rates.

Contingent-valuation methods have become increasingly popular for estimating indirect benefits, but they suffer from the fact that survey instruments have a limited capacity to simulate real-world market behavior. Benefit estimates derived from contingent-valuation studies thus have a greater burden of analytical care to ensure that they represent in an unbiased manner what actually occurs in the marketplace.

4. *Principles and Methods for Valuing Benefits that are Not Traded Directly or Indirectly in Markets.* Some types of goods, such as the social benefit of preserving environmental amenities apart from their use and direct enjoyment by people, are not traded directly or indirectly in markets. The practical obstacles to accurate measurement are similar to (but generally more severe than) those arising with respect to indirect benefits, principally because there are not market transactions to provide data for willingness-to-pay estimates.

Contingent-valuation methods provide the only analytical approaches currently available for estimating the benefits of such untraded goods. The absence of observable and replicable behavior with respect to the benefit in question, combined with the difficulties of avoiding bias in contingent-valuation studies, argues for great care and circumspection in the use of such methods. This means, for example, that estimates of willingness-to-pay must incorporate the variety of alternative means individuals have of expressing value for untraded goods. Moreover, analyses must faithfully capture individuals' budget constraints, which restrict their willingness-to-pay for untraded as well as traded goods and services. Benefit analyses derived from contingent valuation and similar methods thus require considerable analytic rigor in design and careful execution. Absent such efforts, analyses based heavily on the benefits of untraded goods and services ordinarily would fail the test of a satisfactory RIA.

5. *Methods for Valuing Health and Safety Benefits.* For health and safety benefits, a distinction should be made between risks of nonfatal illness or injury and fatality risks.

(a) *Nonfatal illness and injury.* Although the willingness-to-pay approach is conceptually superior, the current state of empirical research in the area is not sufficiently advanced to assure that estimates derived by this method are necessarily superior to direct-cost valuations of reductions in risks of nonfatal illness or injury. Any injury-value estimate from a willingness-

to-pay study is necessarily an average over a specific combination of injuries of varying severity. If the average injury severity in such a study is greatly different from that for the regulatory action under study, then the study's estimated injury value may not be appropriate for evaluating that action. Accordingly, the agency should use whichever approach it considers most appropriate for the decision at hand. The primary components of the direct-cost approach are medical costs and the value of lost production. Possibly important costs that may be omitted by the use of the direct-cost approach are the value of pain and suffering and the value of time lost from leisure and other activities that are not economically directly productive.

(b) *Fatality.* Reductions in fatality risks are best monetized according to the willingness-to-pay approach. The value of changes in fatality risk is sometimes expressed in terms of the "value of life." This is something of a misnomer since the value of a life really refers to the sum of many small reductions in fatality risk. For example, if the annual risk of death is reduced by one in a million for each of two million people, that represents two "statistical lives" saved per year (two million × one millionth = two). If the annual risk of death is reduced by one in 10 million for each of 20 million people, that also represents two statistical lives saved. The conclusion that the fatality risk reductions in these two cases are equivalent implies an assumption. The implicit assumption—that equal increments in risk are valued equally—allows different risk increments to be added together and compared directly. As a different example, suppose there are two alternative reductions in the annual risk faced by an individual:

A: from $.10 \times 10^{-5}$ to $.09 \times 10^{-5} = .01 \times 10^{-5}$
B: from 1.00×10^{-5} to $.99 \times 10^{-5} = .01 \times 10^{-5}$

Since in both cases the reduction in annual risk is the same ($.01 \times 10^{-5}$), the value of A and B should be considered the same.

The assumption that equal increments in fatality risk are of equal value is a legitimate one, so long as the level of fatality risk is below 10^{-4} annually. There is evidence that the willingness-to-pay value for increments in fatality risk does not change significantly over a wide range of risk exposure below 10^{-4} annually.

For levels of annual risk exposure of 10^{-4} and above it cannot be assumed that equal increments of risk are valued equally. At these higher risk levels, it is particularly important to distinguish between situations of voluntary risk assumption and those of involuntary risk. Where the high risk is involuntary, it is appropriate to value reductions in risk from that high level more highly than equal risk reductions at lower risk levels. In general, the greater the risk that an individual bears, the higher will be the value the individual places on marginal changes in risk. On the other hand, where a high risk is chosen voluntarily those assuming the risk tend to be persons who place a relatively low value on averting safety risks. Empirical studies of risk premiums in high-risk occupations suggest that reductions in voluntarily assumed high risks should be valued less than equal risk reductions at ordinary risk levels.

Estimates of the value of fatality risks refer only to changes in an uncertain risk of death. They have no application to the certain prevention of the death of an identifiable individual.

6. *Alternative Methodological Frameworks for Estimating Health and Safety Benefits.* Several alternative ways of incorporating fatality risks into the framework of benefit-cost analysis may be appropriate. These may involve either explicit or implicit valuation of fatality risks.

One acceptable explicit valuation approach would be for the agency to select a single value for reductions in fatality risk at ordinary risk levels (below 10^{-4} annually) and use this value consistently for evaluating all its programs that affect ordinary fatality risks. Another acceptable explicit valuation approach would be to use a range of values for reductions in fatality risk and apply sensitivity analysis as with other parameters that have alternative plausible values. The range of alternative values should be a reasonable one, not one that includes the most extreme upper and lower values of fatality risk reduction that have been estimated. Extreme values are more appropriate for instances of extraordinarily high risks (above 10^{-4} annually), with the extreme low values being appropriate where voluntary assumption of high risk leads to self-selection and the extreme high values being appropriate where the high risk is involuntarily assumed.

Where the analysis uses a range of alternative values for reductions in fatality risk, it may be useful to calculate break-even values, as in other sensitivity analyses. This requires calculating the borderline value of reductions in fatality risk at which the net benefit decision criterion would switch over from favoring one alternative to favoring another (i.e., the value of fatality risk at which the net benefits of the two alternatives are equal). This method will frequently be infeasible because of its computational demands or because alternatives are continuous rather than discrete (e.g., alternative stringencies for exposure levels), but where appropriate, it is a useful supplement to the sensitivity analysis.

An implicit valuation approach could entail calculations of the cost per unit of reduction in fatality risk (cost per "statistical life saved"), with costs defined as costs minus monetized benefits. This must be used with care since there is a serious potential pitfall: It is *not* correct to choose between two mutually exclusive alternatives by selecting the alternative with lowest cost per statistical life saved. The alternative with higher cost per life saved may nonetheless be the alternative with the higher net benefit to society.

The way to avoid this pitfall while retaining the implicit valuation approach is to make all calculations of cost per life saved in terms of increments between alternatives. Alternatives should be arrayed in order of their total reduction in expected fatalities and the incremental cost per life saved calculated between each adjacent pair of alternatives. In contrast to explicit valuation approaches, this avoids the necessity of specifying in advance a value for reductions in fatality risks. However, a range of values will be implied by the final selection of an alternative. This range should be consistent with estimated values of reductions in fatality risks calculated according to the willingness-to-pay methodology.

Another way of expressing reductions in fatality risks is in terms of life-years saved. For example, if a regulation protected individuals whose average remaining life expectancy was 40 years, then a risk reduction of one fatality would be expressed as 40 life-years saved. Such a refinement may be desirable for regulations that disproportionately protect young people (e.g., motor vehicle safety regulations) or elderly people (e.g., regulations controlling carcinogens). To derive the value of a life-year saved from an estimate of the value of life, first determine the average remaining life expectancy of the sample population in the study from which the estimate was drawn. Assuming that the average age of the sample population is known, the average remaining life expectancy may be derived from actuarial tables giving life expectancy in relation to age. Using standard compound interest tables, the value of a life-year saved can then be determined as the estimated value of life annualized over a period equal to the number of years of remaining average life expectancy.

C. Cost Estimates

1. *General Considerations.* The opportunity cost of an alternative is the value of the benefits foregone as a consequence of that alternative. For example, the opportunity cost of banning a product (e.g., a drug, food additive, or hazardous chemical) is the foregone net benefit of that product. It is measured by changes in producers' and consumers' surpluses. (Producers' surplus is the difference between the amount a producer is paid for a unit of a good and the minimum amount the producer would accept to supply that unit. It is measured by the distance between the price and the supply curve for that unit. Consumers' surplus is the difference between what a consumer pays for a unit of a good and the maximum amount the consumer would be willing to pay for that unit. It is measured by the distance between the price and the demand curve for that unit.) As another example, even if a resource required by regulation does not have to be paid for because it is already owned by the regulated firm, nonetheless, the use of that resource to meet the regulatory requirement has an opportunity cost equal to the net benefit it would have provided in the absence of the requirement. Any such foregone benefits for an alternative should be monetized wherever possible and either added to the costs or subtracted from the benefits of that alternative. 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.

All costs calculated should be incremental, that is, they should represent changes in costs that would occur if the regulatory alternative is chosen compared to costs in the base case (ordinarily no regulation or the existing regulation). Future costs that would be incurred even if the regulation is not promulgated, as well as costs that have already been incurred (sunk costs), are not part of incremental costs. If marginal cost is not constant for any component of costs, incremental costs should be calculated as the area under the marginal cost curve over the relevant range.

Costs include private-sector compliance costs, government administrative costs, and costs of reallocating workers displaced as a result of the regulation. Costs that are not monetary outlays must be included and should be attributed a monetary value wherever possible. Such costs may include the value (opportunity cost) of benefits foregone, losses in consumers' or producers' surpluses, discomfort or inconvenience, and loss of time. A schedule of monetized costs should be included that would show the type of cost and when it would occur; the numbers in this table should be expressed in constant, undiscounted dollars. Any expected incremental costs that cannot be monetized should be explained. An important type of cost that often cannot be quantified is a slowing in the rate of innovation or of adoption of new technology. For example, regulations requiring a costly and time-consuming approval process for new products or new facilities may have such costs, as may regulations setting much more stringent standards for new facilities than existing ones.

Two accounting cost concepts that should not be counted as costs in benefit-cost analysis are interest and depreciation. The time value of money is already accounted for by the discounting of benefits and costs. Depreciation is already taken into account by the time distribution of benefits and costs; the only legitimate use for depreciation calculations in benefit-cost analysis is to estimate the salvage value of a capital investment.

2. *Real Costs versus Transfer Payments.* An important, but sometimes difficult, problem in cost estimation is to distinguish between real costs and transfer payments. Transfer payments are not genuine costs but payments for which no real good or service is received in return. Several examples of problems that may arise from the confusion between transfer payments and real costs (or benefits) may help to identify situations in which further analysis of the problem may be warranted. Monopoly profits, insurance payments, government subsidies and taxes, and distribution expenses are four potential problem areas.

(a) *Monopoly profits.* If, for example, sales of a competitively produced product were restricted by a government regulation so as to raise prices to consumers, the resulting monopoly profits are not a benefit of the rule, nor is their payment by consumers a cost. The real benefit-cost effects of the regulation would be represented by changes in producers' and consumers' surpluses.

(b) *Insurance payments.* Potential pitfalls in benefit-cost analysis may also arise in the case of insurance payments, which are transfers. Suppose, for example, a worker safety regulation, by decreasing employee injuries, led to reductions in firms' insurance premium payments. It would be incorrect to count the amount of the reduction in insurance premiums as a benefit of the rule. The proper measure of benefits is the value of the reduction in worker injuries, monetized as described previously, plus any reduction in real costs of administering insurance (such as the time of insurance company employees needed to process claims) due to the reduction in worker insurance claims. Reductions in insurance premiums that are matched by reductions in insurance claim payments are changes in transfer payments, not benefits.

(c) *Indirect taxes and subsidies.* A third instance where special treatment may be needed to deal with transfer payments is the case of indirect taxes (tariffs or excise taxes) or subsidies on specific goods or services. Suppose a regulation requires firms to purchase a $10,000 piece of imported equipment, on which there is a $1,000 customs duty. For purposes of benefit-cost analysis the cost of the regulation for each firm ordinarily would be $10,000, not $11,000, since the $1,000 customs duty is a transfer payment from the firm to the Treasury, not a real resource cost. This approach, which implicitly assumes that the equipment is supplied at constant costs, should be used except in special circumstances. Where the taxed equipment is not supplied at constant cost, the technically correct treatment is to calculate how many of the units purchased as a result of the regulation are supplied from increased production and how many from decreased purchases by other buyers. The former units would be valued at the price without the tax and the latter units would be valued at the price including tax. This calculation is usually difficult and imprecise because it requires estimates of supply and demand elasticities, which are often difficult to obtain and inexact. Therefore, this treatment should only be used where the benefit-cost conclusions are likely to be sensitive to the treatment of the indirect tax. While costs ordinarily should be adjusted to remove indirect taxes on specific goods or services as described here, similar treatment is not warranted for other taxes, such as general sales taxes applying equally to most goods and services or income taxes.

(d) *Distribution expenses.* The treatment of distribution expenses is also a source of potential error. For example, suppose a particular regulation raises the cost of a product by $100 and that wholesale and retail distribution expenses are on average 50 percent of the factory-level cost. It would ordinarily be incorrect to add a $50 distribution markup to the $100 cost increase to derive a $150 incremental cost per product for benefit-cost analysis. Most real resource costs of distribution do not increase with the price of the product being distributed. In that case, either distribution expenses would be unchanged or, if they increased, the increase would represent distributor monopoly profits. Since the latter are transfer payments, not real resource costs, in neither case should additional distribution expenses be included in the benefit-cost analysis. However, increased distribution expenses should be counted as costs to the extent that they correspond to increased real resource costs of the distribution sector as a result of the change in the price or characteristics of the product.

D. Expenditure Rules

Regulations establishing terms or conditions of Federal grants, contracts, or financial assistance call for a different form of regulatory analysis than do other types of regulation. In some instances, a full-blown benefit-cost analysis may be appropriate to inform Congress and the President more fully about the desirability of the program, but this would not ordinarily be required in a Regulatory Impact Analy-

sis. The primary function of the RIA for this type of regulation should be to verify that the terms or conditions are the minimum necessary to achieve the purposes for which the funds were appropriated. They should not contain conditions in pursuit of goals that are not germane to the purpose for which the funds were authorized and appropriated. Beyond controls to prevent abuse and to ensure that funds appropriated to achieve a specific purpose are channeled efficiently toward that end, maximum discretion should be allowed in the use of Federal funds, particularly when the recipient is a State or local government.

IV. RATIONALE FOR CHOOSING THE PROPOSED REGULATORY ACTION

The RIA should include an explanation of the reasons for choosing the selected regulation. Ordinarily, the regulatory alternative selected should be the one that achieves the greatest net benefits. If legal constraints prevent this choice, they should be identified and explained, and their net cost should be estimated.

Where uncertainties are substantial or a large proportion of benefits cannot be monetized, other methods of summarizing the benefit-cost analysis may sometimes be appropriate. When alternative forms of presentation are used, the objective must continue to be the maximization of net benefits (except where prohibited by law). Alternative criteria must be used with care because of the potential for errors or misinterpretation.

Agencies need not calculate the internal rate of return for a regulation. The internal rate of return is often difficult to compute and is problematical when multiple rates exist. It must not be used as a criterion for choosing between mutually exclusive alternatives. As a criterion for choosing between alternatives that are not mutually exclusive, it has no advantages over the criterion of maximizing the present value of net benefits.

Benefit-cost ratios, if used at all, must be used with care to avoid a common pitfall. It is a mistake to choose among mutually exclusive alternatives by selecting the alternative with the highest ratio of benefits to costs. An alternative with a lower benefit-cost ratio than another may have the higher net benefits. Whether a regulation's benefits are greater (or less) than its costs can be determined by whether its benefit-cost ratio is greater (or less) than one. The benefit-cost ratio may be used as a very simplified indicator of the likely sensitivity of the result: If the benefit-cost ratio is much greater than one, the conclusion that the regulation's benefits exceed its costs probably is not sensitive to likely alternative parameter values. If the ratio is only slightly greater than one, the conclusion probably is sensitive. The benefit-cost ratio may sometimes be acceptable as a rough substitute for genuine sensitivity analysis where it is not feasible to carry out a full sensitivity analysis (e.g., if the number of regulatory parameters to be tested by sensitivity analysis is large). When so used, the benefit-cost ratio should be recognized as only a crude approximation to a genuine sensitivity analysis and the analyst should be aware of its limitations (e.g., the benefit-cost ratio is sensitive to the arbitrary classification of an item as a benefit or an averted cost).

Where the benefits of proposed regulatory alternatives include reductions in fatality risks, an acceptable alternative to direct calculation of net benefits is the indirect approach of calculating incremental costs per life saved between adjacent alternatives. This is done by ranking all the alternatives according to the number of lives they save and then calculating the change in costs and the change in lives saved between each alternative and the one with the next highest number of lives saved. If the alternative selected is the one whose incremental cost per life saved is closest to the willingness-to-pay value of life, this decision criterion is analytically equivalent to that of maximizing net benefit.

In cases where important benefits cannot be assigned monetary values, cost-effectiveness analysis should be used where possible to evaluate alternatives that generate equivalent nonmonetizable benefits. Costs should be calculated net of monetized benefits. Between two alternatives with equivalent nonmonetizable benefits, the alternative with the lower net costs should be selected. Cost-effectiveness analysis should also be used to compare regulatory alternatives in cases where the level of benefits is specified by statute.

V. STATUTORY AUTHORITY

The RIA should include a statement of determination and explanation that the proposed regulatory action is within the agency's statutory authority.

Further Reading

Edith Stokey and Richard Zeckhauser, *A Primer for Policy Analysis.* Chapters 9 and 10 provide a good introduction to basic concepts.

E. J. Mishan, *Economics for Social Decisions: Elements of Cost-Benefit Analysis.* Assumes some knowledge of economics. Chapters 5–8 should be helpful on the important subjects of producers' and consumers'

surpluses (not discussed extensively in this guidance document).

W. Kip Viscusi, *Risk By Choice.* Chapter 6 is a good starting point for the topic of valuing health and safety benefits. Other more technical sources are given in the bibliography.

Robert Cameron Mitchell and Richard C. Carson, *Using Surveys to Value Public Goods: The Contingent Valuation Method.* Provides a valuable discussion on the potential pitfalls associated with the use of contingent-valuation methods.

V. Kerry Smith, Ed., *Advances in Applied Microeconomics: Risk, Uncertainty, and the Valuation of Benefits and Costs.*

Judith D. Bentkover, Vincent T. Covello, and Jeryl Mumpower, Eds., *Benefits Assessment: The State of the Art.*