Regulatory Benefit-Cost Analysis

Committee on Criteria for Installing Automatic and Remote-Controlled Shutoff Valves on Existing Gas and Hazardous Liquid Transmission Pipelines
National Academies of Sciences, Engineering, and Medicine

July 26, 2022

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Outline

- Federal requirements
- General framework
- Components and steps

Federal Requirements

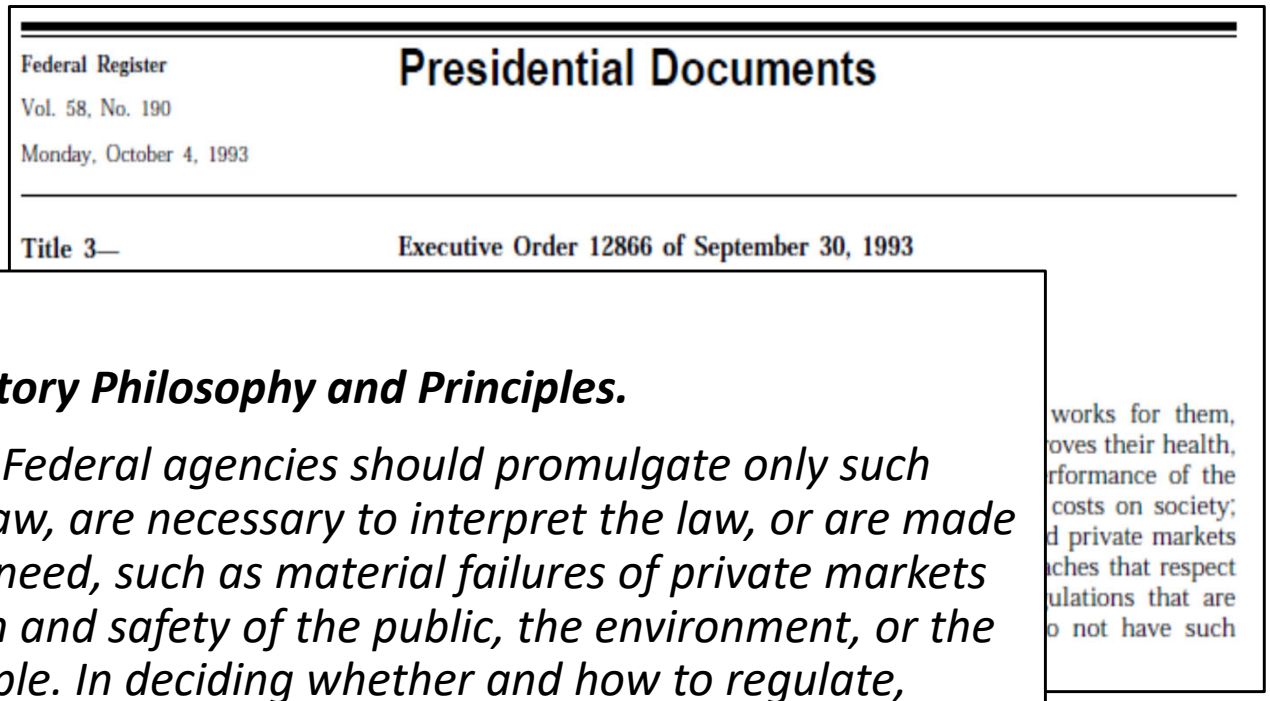
Part of regulatory development process

- Congress authorizes agencies to develop regulations and other programs.
- Administrative Procedure Act governs the rulemaking process.
- Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget (OMB), Executive Office of the President, reviews major rules from executive branch agencies prior to promulgation.
- Steps include:
  - Agency develops proposed regulation and supporting analysis; reviews internally.
  - OIRA reviews proposed regulation and supporting analysis, if applicable.
  - Agency publishes preamble and proposed rule in the Federal Register, placing supporting technical documents in the regulatory docket; requests public comments.
  - Agency develops, OMB reviews (if applicable), and agency publishes final rule and supporting documents.
  - Congress reviews rule under the Congressional Review Act.

Longstanding requirements

- Analysis of major U.S. regulations prior to promulgation has been required for over 40 years.
- Several presidential executive orders establish requirements for regulatory analysis and review.
  - Requirements apply to executive branch agencies (primarily cabinet agencies that report directly to the President).
  - Independent agencies (such as the Nuclear Regulatory Commission) typically also follow the analytic requirements voluntarily.
- Core is benefit-cost analysis; several supplemental analyses also required (e.g., small business impacts).
- Current requirements are in Executive Order 12866 (Clinton 1993) supplemented by Executive Order 13563 (Obama 2011).
- Focus on "economically significant" and "significant" regulations.
- Agencies often also assess less significant regulations.
  - Analysis frequently less comprehensive; e.g., focus on costs and do not estimate benefits.

Derived from Presidential executive orders



Federal Register
Vol. 58, No. 190
Monday, October 4, 1993

Presidential Documents

Title 3—

Executive Order 12866 of September 30, 1993

works for them,
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Executive Order 12866

Section 1. Statement of Regulatory Philosophy and Principles.

*(a) **The Regulatory Philosophy**. Federal agencies should promulgate only such regulations as are required by law, are necessary to interpret the law, or are made necessary by compelling public need, such as material failures of private markets to protect or improve the health and safety of the public, the environment, or the well-being of the American people. In deciding whether and how to regulate, agencies should assess **all costs and benefits** of available **regulatory alternatives**, **including the alternative of not regulating**. Costs and benefits shall be understood to include **both quantifiable measures** (to the fullest extent that these can be usefully estimated) and **qualitative measures** of costs and benefits that are difficult to quantify, but nevertheless essential to consider. Further, in choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; **distributive impacts; and equity**), unless a statute requires another regulatory approach.*

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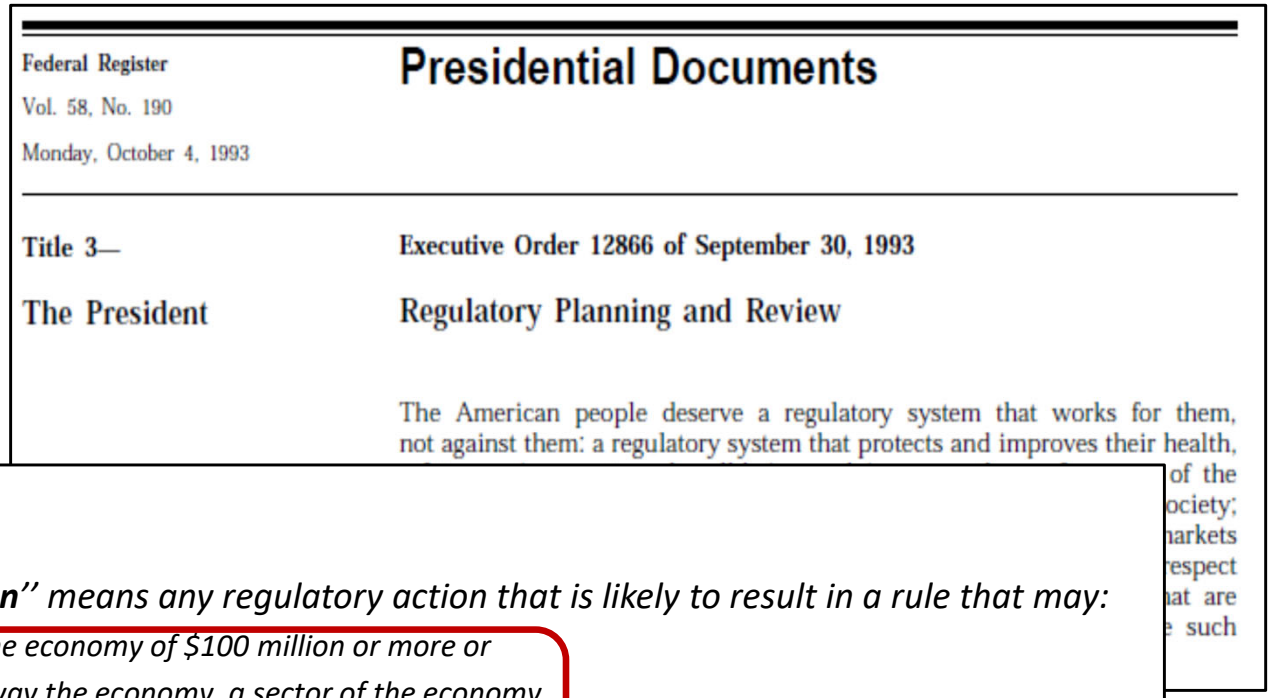
Focus on significant regulations



Federal Register
Vol. 58, No. 190
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Presidential Documents

Title 3—
The President

Executive Order 12866 of September 30, 1993

Regulatory Planning and Review

The American people deserve a regulatory system that works for them, not against them: a regulatory system that protects and improves their health,

of the
ociety;
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Executive Order 12866

*(f) "**Significant regulatory action**" means any regulatory action that is likely to result in a rule that may:*

"Economically significant"

(1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive order.

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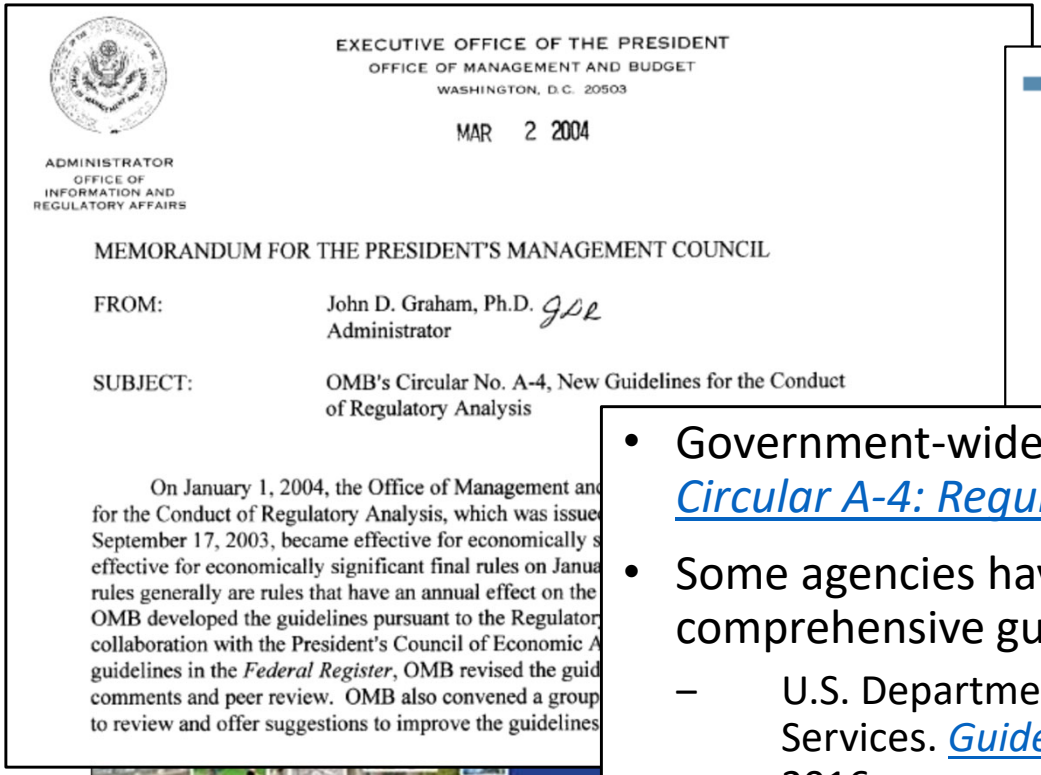
Substantial guidance available



EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

MAR 2 2004

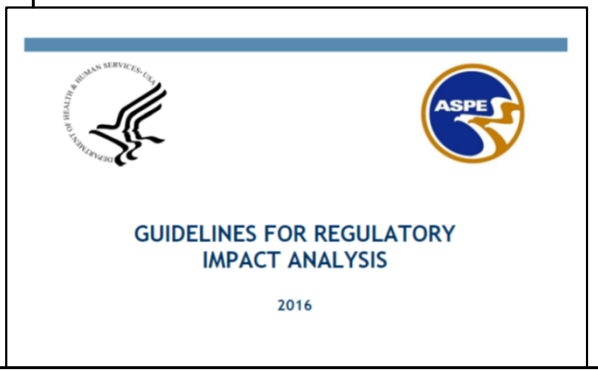
ADMINISTRATOR
OFFICE OF
INFORMATION AND
REGULATORY AFFAIRS

MEMORANDUM FOR THE PRESIDENT'S MANAGEMENT COUNCIL

FROM: John D. Graham, Ph.D.
Administrator

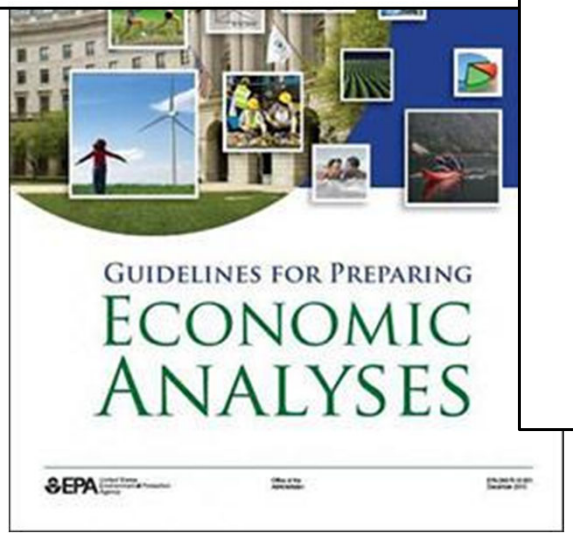
SUBJECT: OMB's Circular No. A-4, New Guidelines for the Conduct of Regulatory Analysis

On January 1, 2004, the Office of Management and
for the Conduct of Regulatory Analysis, which was issue
September 17, 2003, became effective for economically s
effective for economically significant final rules on Janua
rules generally are rules that have an annual effect on the
OMB developed the guidelines pursuant to the Regulator
collaboration with the President's Council of Economic A
guidelines in the *Federal Register*, OMB revised the guid
comments and peer review. OMB also convened a group
to review and offer suggestions to improve the guidelines



GUIDELINES FOR REGULATORY
IMPACT ANALYSIS

2016



GUIDELINES FOR PREPARING
ECONOMIC
ANALYSES

EPA

- Government-wide implementing guidance in *OMB Circular A-4: Regulatory Analysis* (2003).
- Some agencies have developed more detailed and comprehensive guidance.
  - U.S. Department of Health and Human Services. *Guidelines for Regulatory Impact Analysis*, 2016.
  - U.S. Environmental Protection Agency. *Guidelines for Preparing Economic Analyses*, 2010 (with updates; undergoing revision).
  - U.S. Department of Transportation. Economic Values used in Analysis (2021).
    - Addresses values for fatal and nonfatal injuries and time savings only; updated annually.

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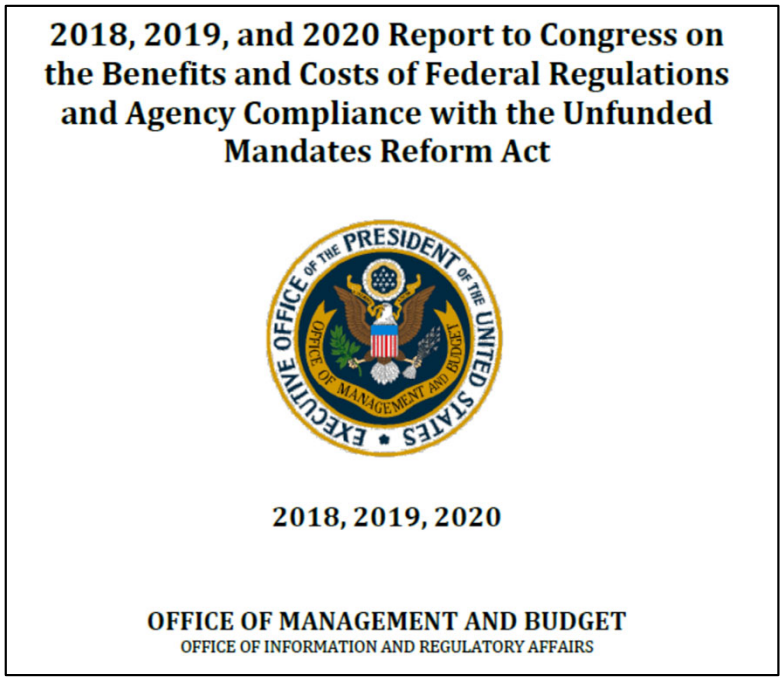
OMB compiles and summarizes results annually



2018, 2019, and 2020 Report to Congress on the Benefits and Costs of Federal Regulations and Agency Compliance with the Unfunded Mandates Reform Act

2018, 2019, 2020

OFFICE OF MANAGEMENT AND BUDGET
OFFICE OF INFORMATION AND REGULATORY AFFAIRS

https://www.whitehouse.gov/omb/information-regulatory-affairs/reports/#ORC

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General Framework

Comparative exercise

Aim is to:

- estimate net benefits (benefits minus costs) of alternative policies compared to no action,
- and describe the distribution of impacts across the advantaged and disadvantaged,
- with appropriate consideration of nonquantified effects and uncertainty.

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Focuses on opportunity costs

- What is the best allocation of limited resources?
  - If we use resources (e.g., labor, materials) for one purpose, they will not be available for other uses.

Value is based on individual preferences

- Estimate how much money an affected individual is willing to pay or accept for the outcome.

- Assume individuals are the best (most legitimate) judge of their own welfare.
  - Respects individual preferences, not paternalistic.
- Focus on estimating reasonably thoughtful, well-informed preferences.

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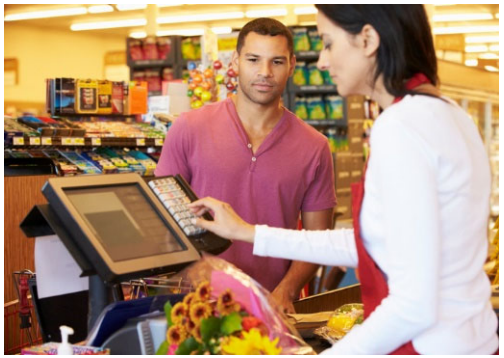
Valuation approach depends on whether the outcome is traded in markets.



- Rely on *market data* where possible.
  - Presumably, if an individual chooses to buy a good or service, he or she values it more than the other things the money could buy.
- For nonmarketed goods, use stated or revealed preference methods.
  - *Stated preferences* – ask respondents what they would be willing to pay under hypothetical scenarios (contingent valuation, choice experiments).
  - *Revealed preferences* – use data on market transactions or observed behavior to estimate value, controlling statistically for other attributes.

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Goal is to…

…describe extent to which individuals are willing, as members of a society, to reduce their consumption of other goods and services to achieve specific policy outcomes.

Informs, rather than determines, decision

A policy should not necessarily be implemented simply because its benefits exceed its costs.

- Comparison to other policies is necessary to identify the most efficient use of resources.
- Decision-makers also must consider issues such as legal, political, and budgetary constraints as well as the distribution of the impacts.

Process provides many additional insights

- Requirements motivate detailed examination of impacts, important discoveries regardless of end result.
  - Preferences of those affected,
  - Otherwise unanticipated consequences,
  - Key uncertainties,
  - Available technology, costs, effectiveness,
  - Who bears costs, who receives benefits,
  - Sources of support and opposition.

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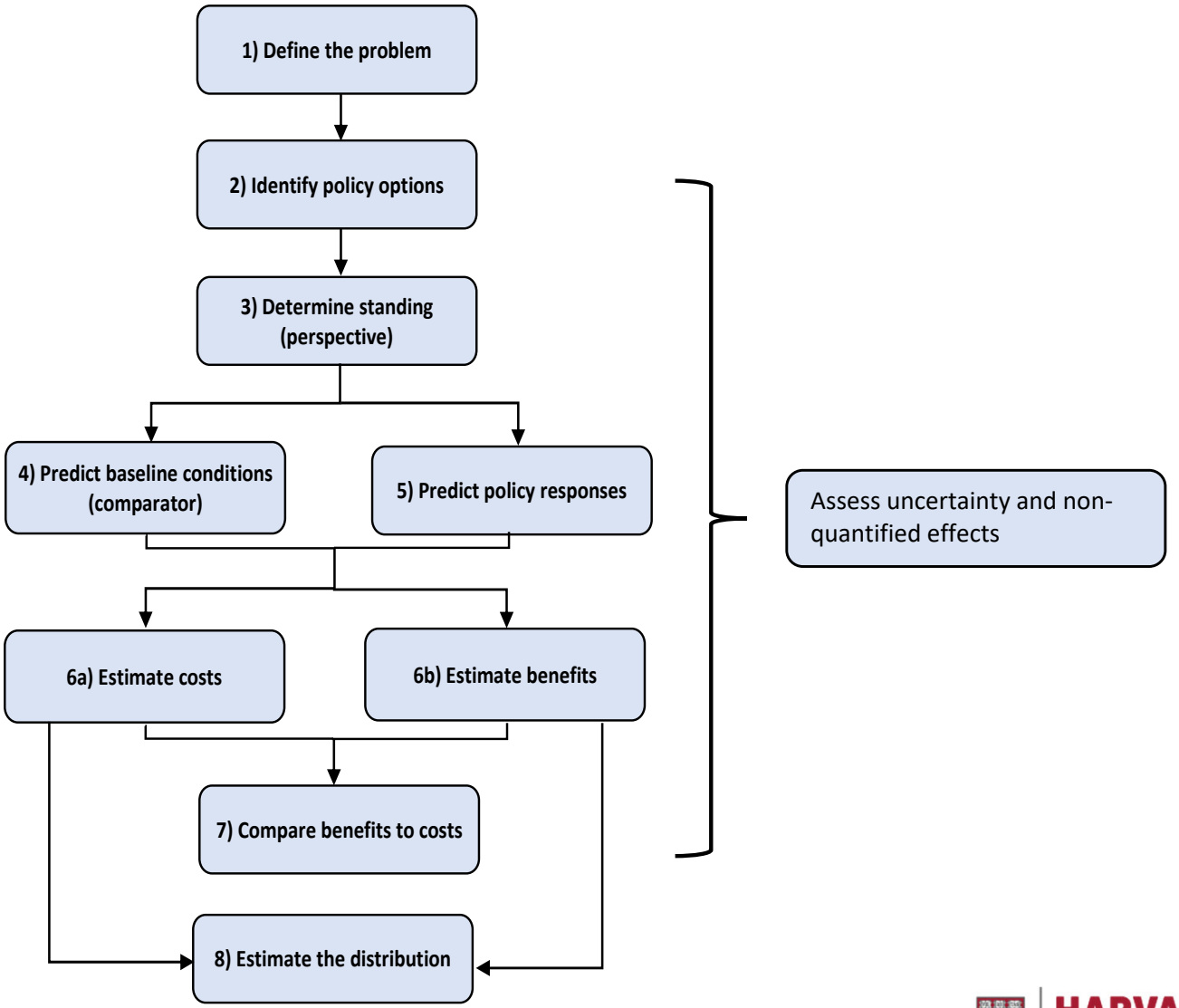
Components and Steps

* For more detail, see agency guidance documents and chapter 2 of *Reference Case Guidelines for Benefit-Cost Analysis in Global Health and Development*.

Analytic components



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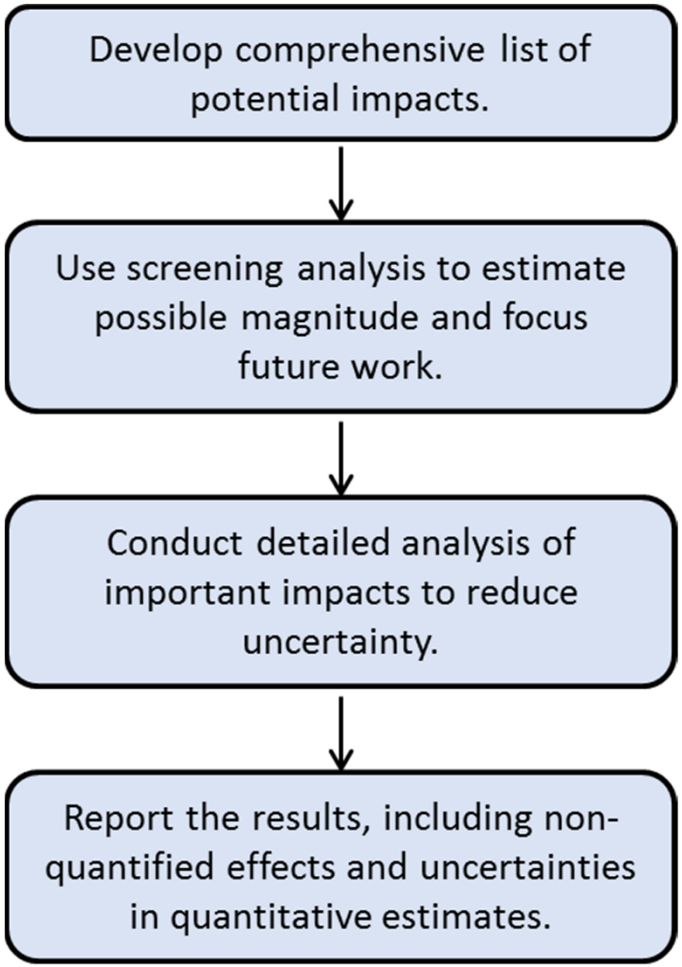
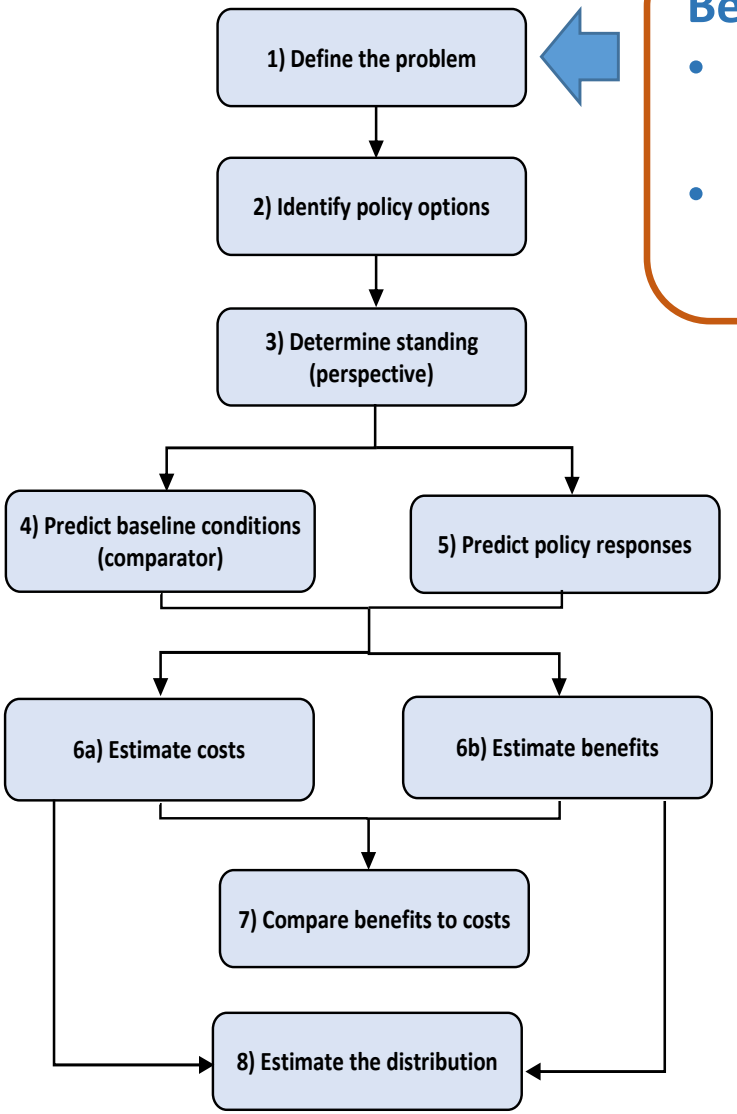
Implementation steps: Scoping and screening



Define the problem



Begin by characterizing problem.

- ***May involve substantial heterogeneity.***
- ***Size, materials, location, technology, human factors etc.***

Assess uncertainty and non-quantified effects

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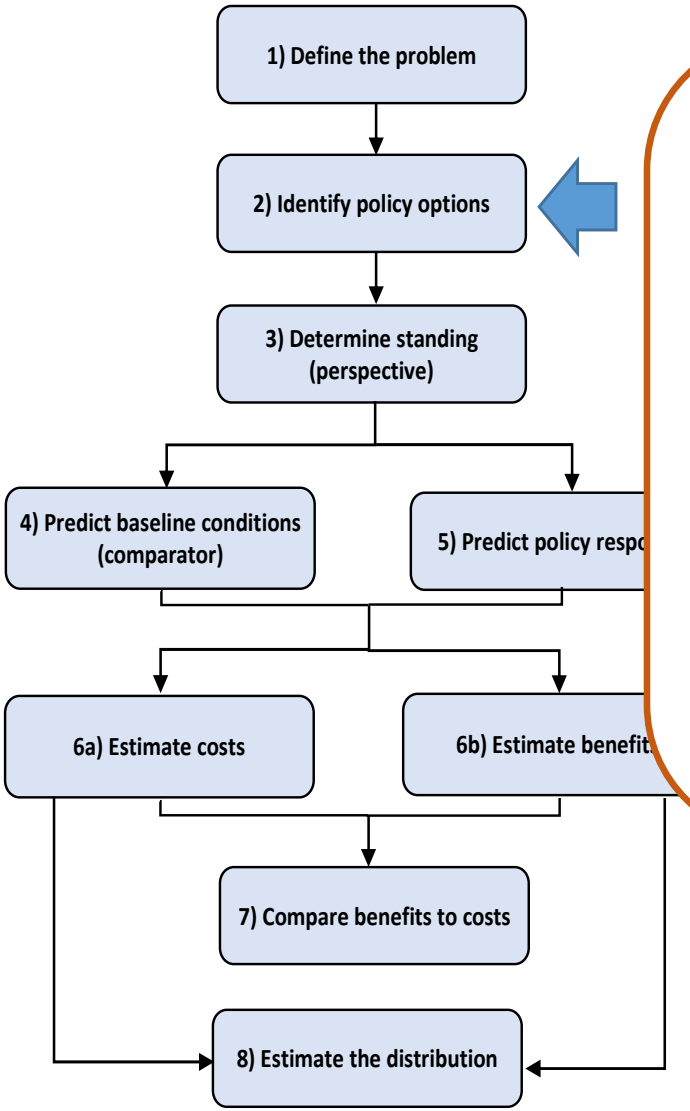
Identify policy options



Typically assess preferred policy and perhaps one more and one less stringent alternative

- ***Should a broader set of alternatives be considered?***
- ***Should analysis address requirements that vary across contexts?***
- ***How will the requirements be enforced?***

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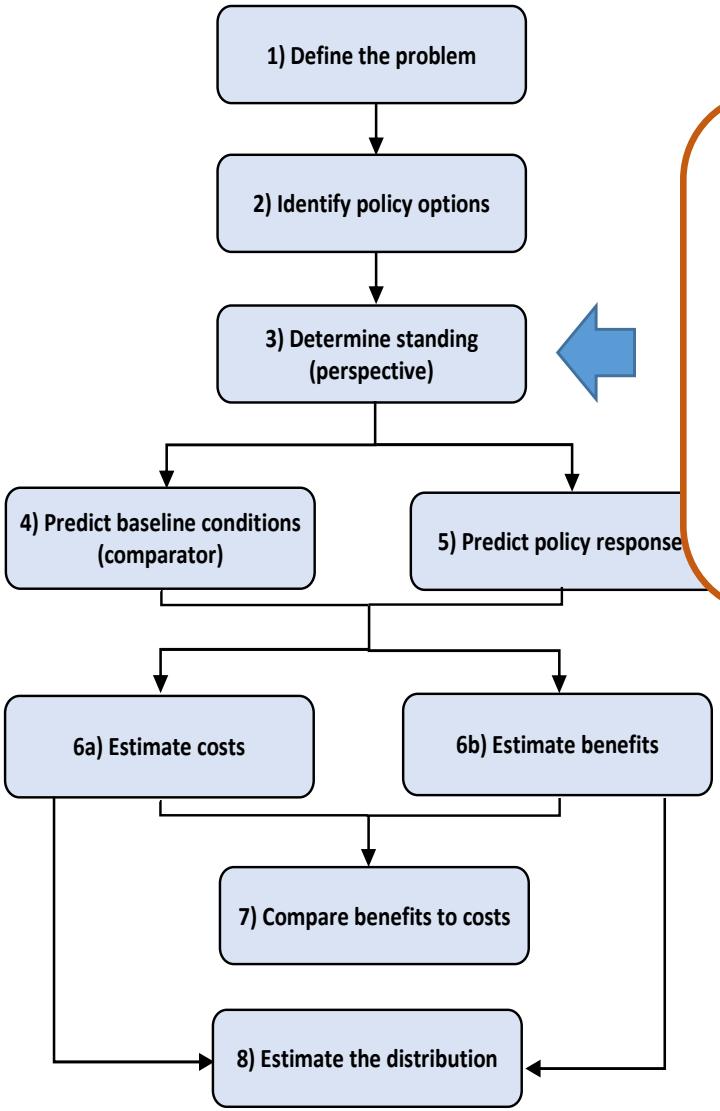
Determine standing



Whose benefits and costs count?

- ***Focus on potentially affected members of the U.S. population.***
- ***Assess international impacts if significant.***

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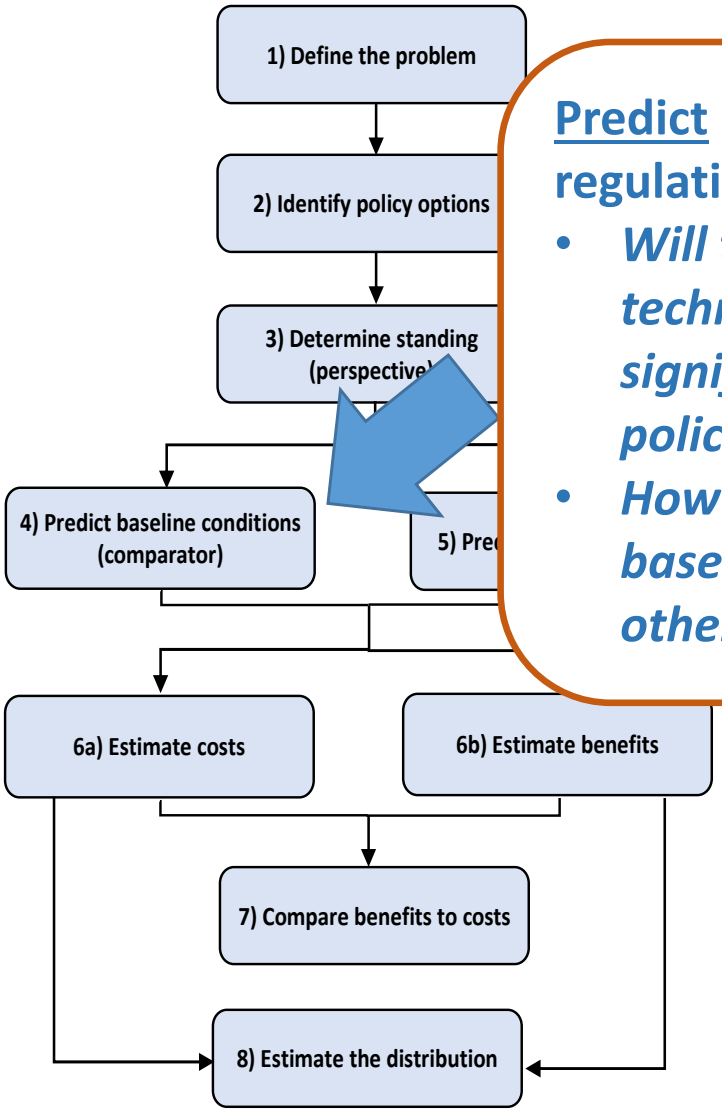
Predict baseline conditions



Predict conditions *without* the regulation over time

- ***Will the economy, population, technology etc. change significantly without the policy?***
- ***How will these changes affect baseline costs, health risks and other outcomes?***

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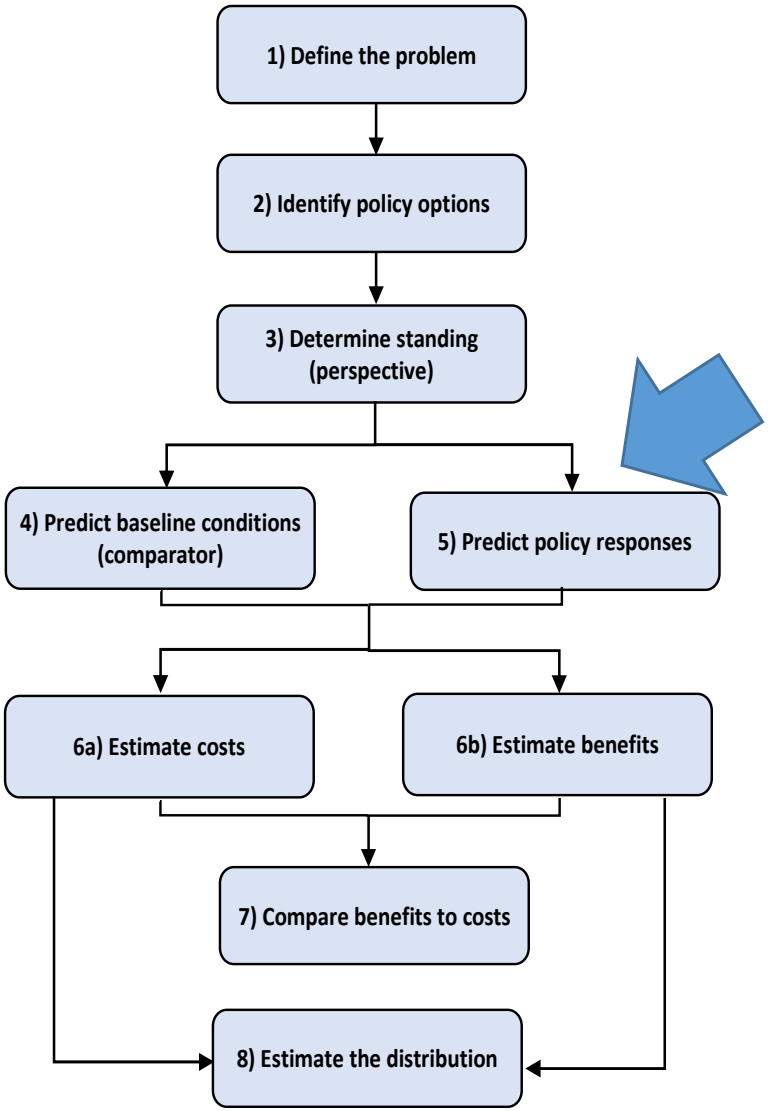
Predict policy responses



Predict conditions *with* the regulation over time

Often the most difficult step!

- ***How will regulated entities respond?***
- ***How will responses change over time?***
- ***What are the implications for costs, health risks, other impacts?***

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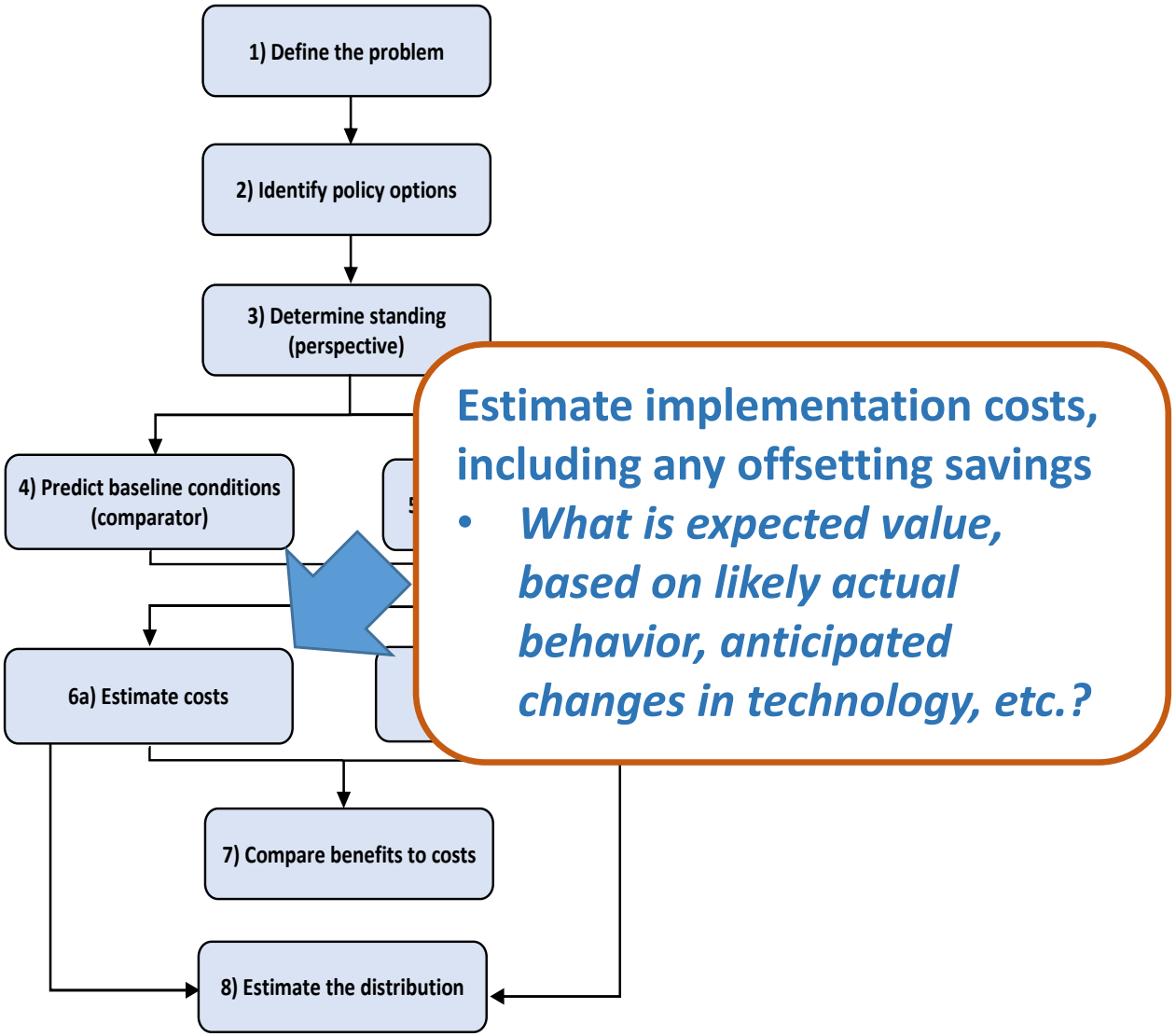
Estimate costs



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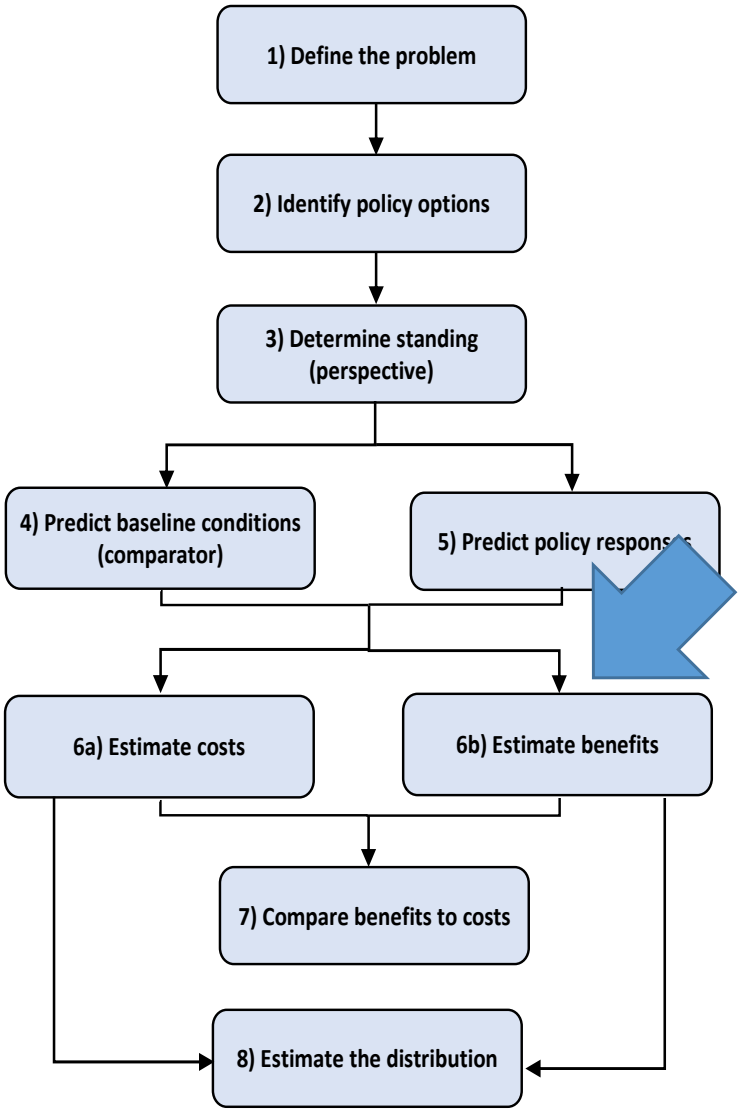
Estimate benefits



Estimate changes in expected deaths, illnesses, injuries, and other outcomes including any countervailing risks; estimate monetary value.

- ***Follow standard approach for valuing changes in deaths and nonfatal illnesses and injuries.***
- ***Averted property damages often valued based on market prices.***
- ***Valuing environmental improvements is more difficult.***
  - ***Commercial, recreational use?***
  - ***Intrinsic value?***
  - ***Long term (climate) impacts?***

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Estimate benefits: Valuing health impacts

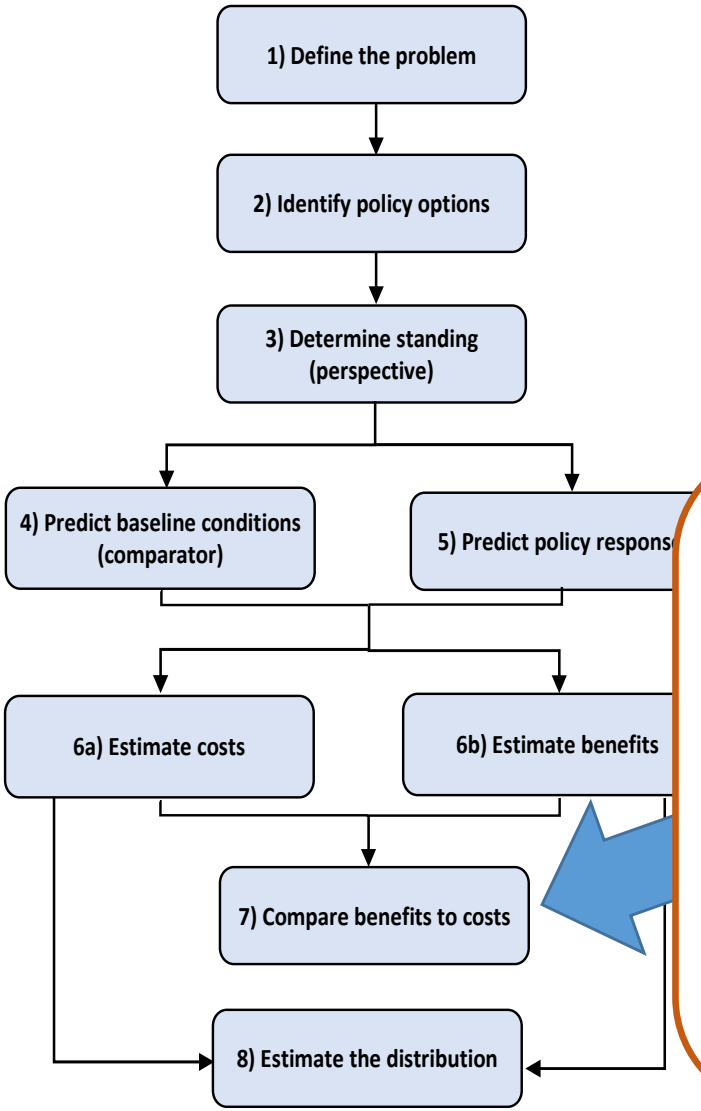
- For changes in mortality risks, apply estimates of the value per statistical life (VSL).
  - Represents individual's willingness to exchange his or her own income for a small change in his or her own risk.
  - ***Not*** the value of saving an identifiable life with certainty.
- Estimates are very similar across agencies.

Agency	Recommended VSL Estimates		Basis
	As reported (range)	***2019*** US dollars & income levels	
US Environmental Protection Agency (EPA 2010)	$7.4 million (standard deviation: $4.7 million) (2006 US dollars)	$11.1 million	21 wage-risk and 5 stated-preference studies (Viscusi 1992, 1993)
US Department of Health and Human Services (HHS 2016)	$9.3 million ($4.4 million to $14.6 million) (2014 US dollars)	$10.6 million	6 wage-risk studies plus 1 meta-analysis and 3 stated-preference studies (Robinson and Hammitt 2016)
US Department of Transportation (DOT 2020)	$9.4 million ($5.2 million – $13.0 million) (2014 US dollars)	$10.9 million	9 wage-risk studies (DOT 2016)

Estimate benefits: Valuing health impacts

- For changes in morbidity (nonfatal) risks, apply estimates of the value per statistical case (VSC).
  - Same conceptual approach as mortality.
  - Valuation research is lacking for many illnesses and injuries.
- Agencies vary in how they approximate these values.
  - EPA: Averted costs of illness (medical costs, lost productivity)
  - HHS, DOT: Monetized quality-adjusted life years (QALYs) plus third party averted costs (insured medical costs, caregiving).

Compare benefits to costs



Calculate net benefits (benefits minus costs)

- ***Reflect time value of money.***
- ***Illustrate distribution of costs and benefits over time***
- ***Estimate net present value and annualized value.***
  - ***Use 3% and 7% discount rates***

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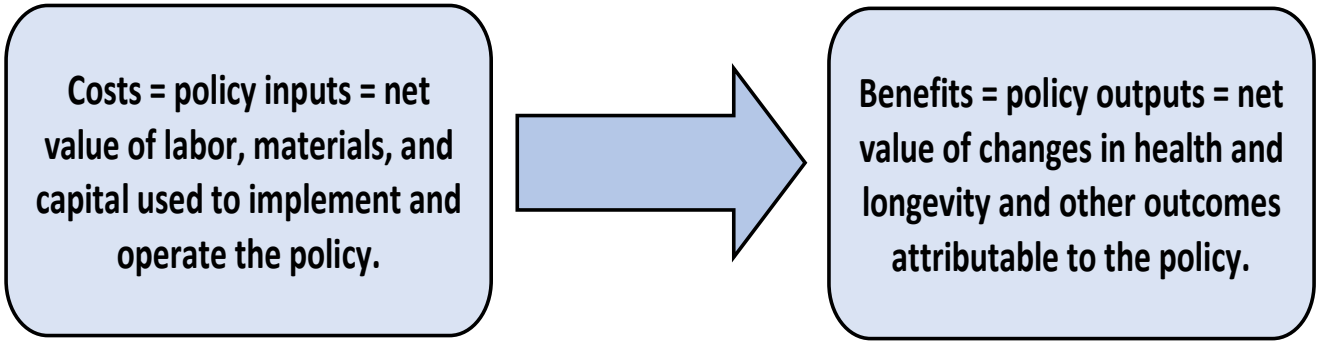
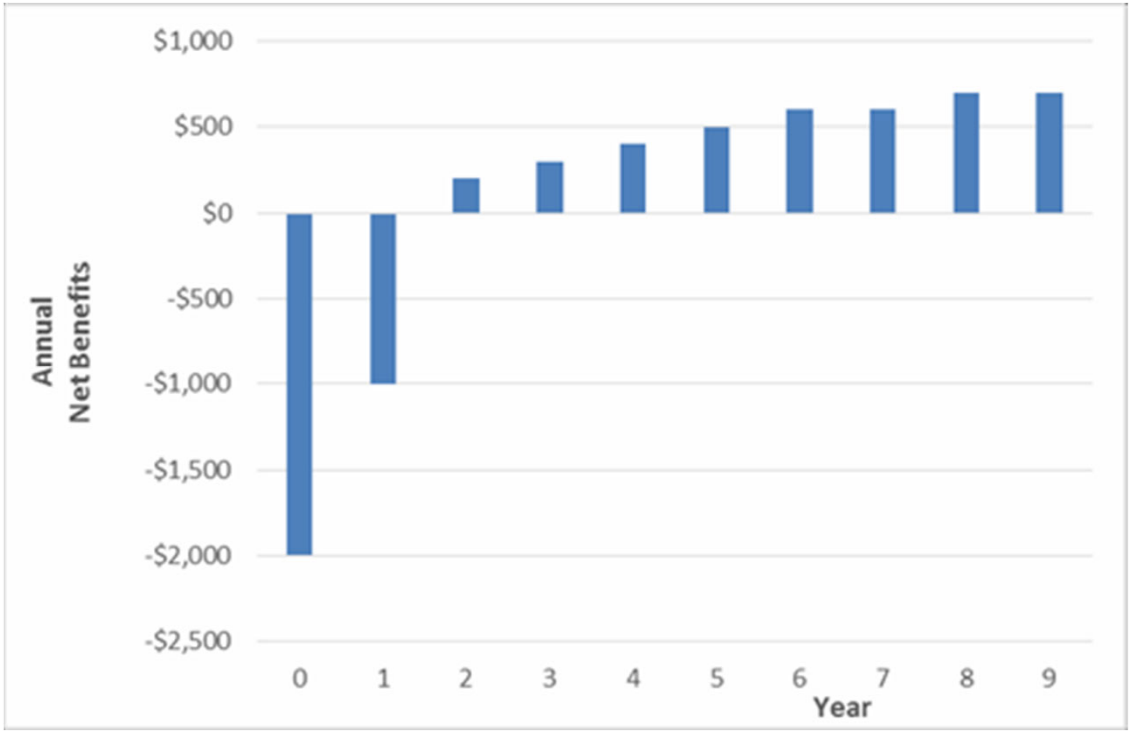
Compare benefits to costs: Summary measures

- Consistent categorization of benefits and costs is needed for total benefits, total costs, and benefit-cost ratios to be comparable across analyses.



- Net benefits are often used when selecting among options for addressing a particular problem.
- Benefit-cost ratios or IRRs are often used in prioritizing spending across diverse policies.
  - Need to be interpreted with care.

Compare benefits to costs: Allocation over time



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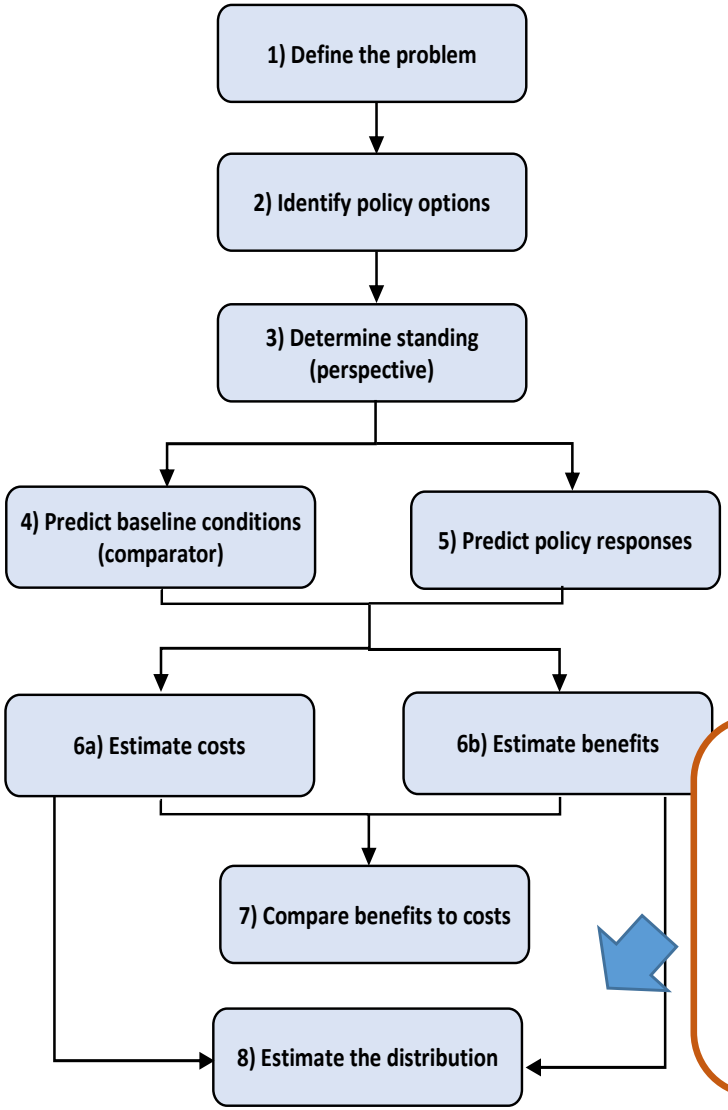
Estimate the distribution



Estimate distribution of costs and benefits across advantaged and disadvantaged groups

- ***Required, but often ignored or incomplete.****

* See: Robinson, L.A., J.K. Hammitt, and R. Zeckhauser. "Attention to Distribution in U.S. Regulatory Analysis," *Review of Environmental Economics and Policy*, 10(2): 308-328, 2016.

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Estimate the distribution: Assessing the distribution of costs is particularly difficult

FIGURE 1. DISTRIBUTION OF HEALTH RISK REDUCTIONS

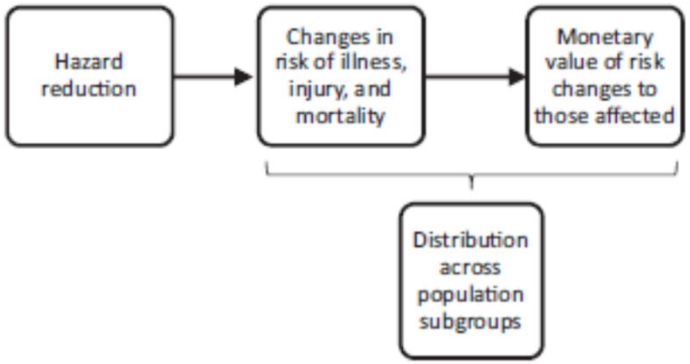
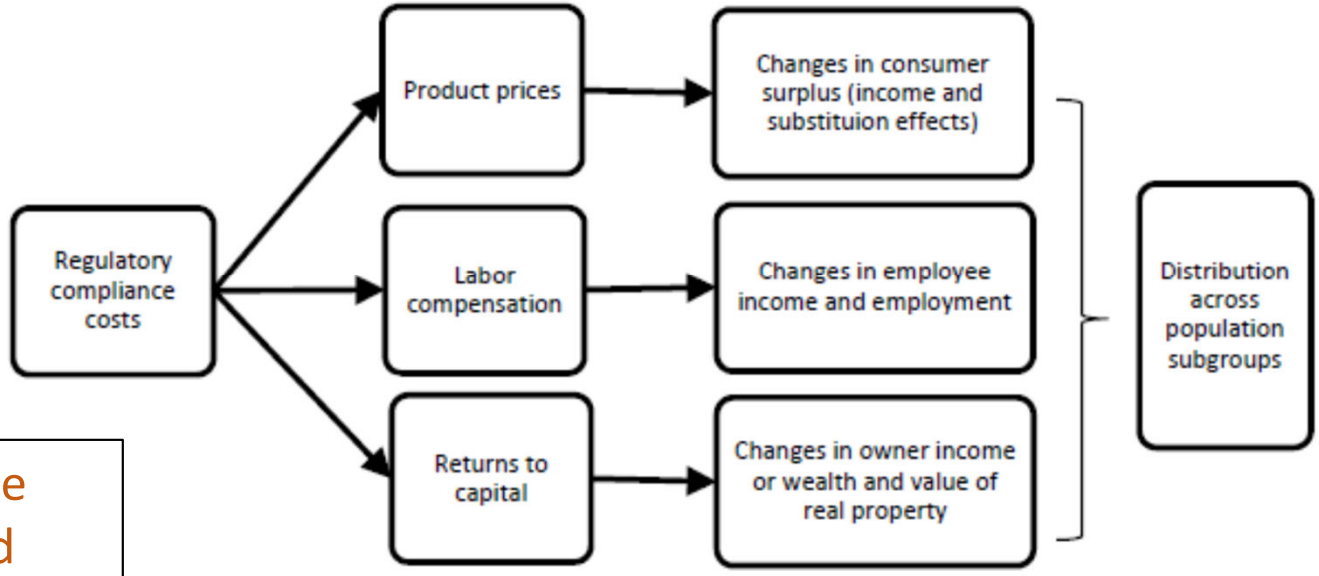
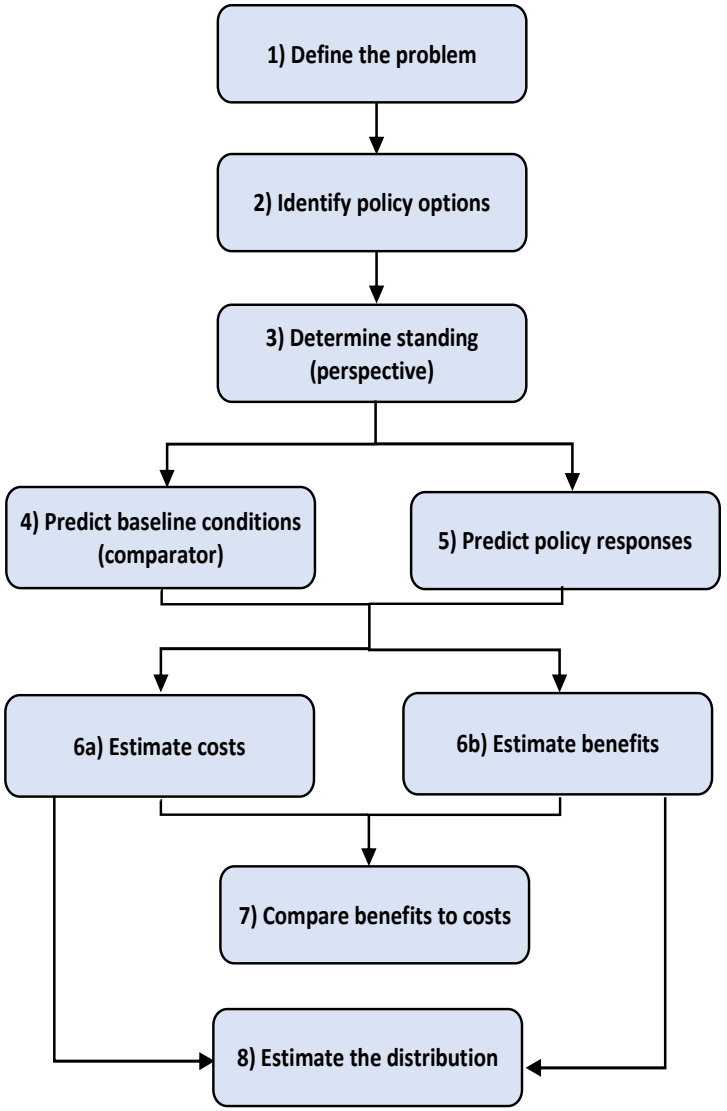


FIGURE 2. DISTRIBUTION OF COMPLIANCE COSTS



What if the benefits accrue primarily to disadvantaged groups, but the costs they bear exceed the value of the benefits?

Assess uncertainty and non-quantified effects



Assess uncertainty and non-quantified effects

Characterize uncertainty, non-quantified effects

- ***How likely is it that the benefits will the exceed costs? that the relative ranking of policies will change? that the magnitude of the net benefits will change?***
- ***What are the likely magnitudes, implications of nonquantified effects?***

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Assess uncertainty: Quantitative analysis

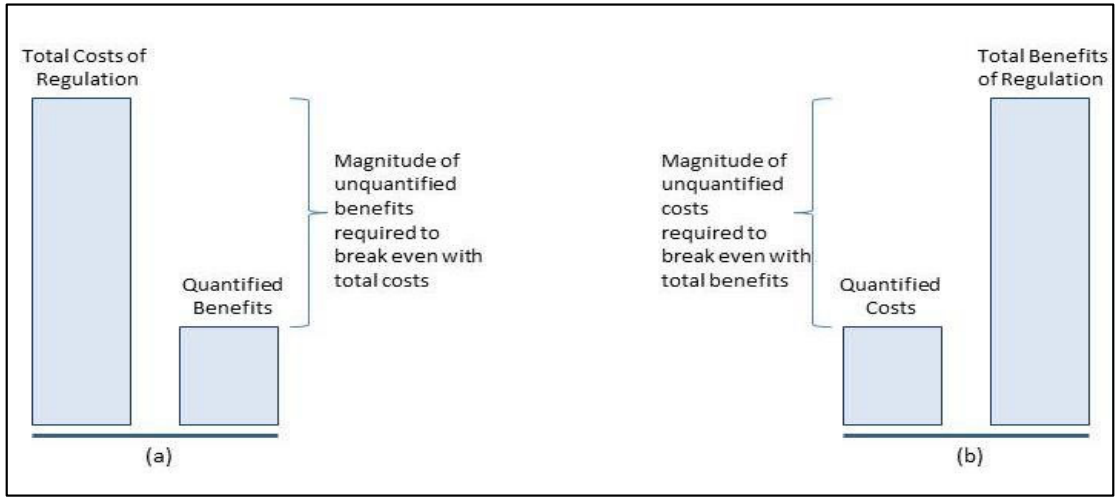
APPROACH	APPLICABILITY	CONDUCT
Qualitative Discussion	• For all analyses. • May suffice if: – the rule involves annual economic effects less than $1 billion; – the analyst is able to demonstrate that the results are robust to uncertainties; and, – the consequences of the rule are modest.	Disclose key assumptions and uncertainties and include information on the implications for decision-making.
Numerical Sensitivity Analysis	• For rules involving annual economic effects less than $1 billion, where: – the qualitative discussion raises questions about the robustness of the results; or, – the consequences of the rule are large.	Vary one or many parameters to calculate distinct sets of results for comparison.
Probabilistic Analysis	• For rules involving annual economic effects of $1 billion or more (required). • For rules with smaller impacts where numerical sensitivity analysis raises questions about the robustness of the results.	Develop distributions for the uncertain parameters and conduct Monte Carlo analysis to determine the distribution of the results.

* Replicates Table 6.1 from HHS *Guidelines for Regulatory Impact Analysis*; reflects OMB *Circular A-4* requirements.

Assess uncertainty: Nonquantified effects

- Challenge is to ensure impacts are appropriately weighted; qualitative discussion necessary but insufficient.
- Options include bounding, breakeven, and cost-effectiveness analysis and/or structured expert elicitation.

Breakeven analysis



- All *require some information on potential magnitude* to apply or to interpret implications.

* Replicates Figure 6.1 from HHS Guidelines for Regulatory Impact Analysis.

Thank you!

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