



Benefit-Cost Analysis in Environmental Decision Making

Adjusting for the Time Dimension of Environmental Benefits and Costs

- **Present Value Determination** – a procedure that discounts a future value (FV) into its present value (PV) by accounting for the opportunity cost of money
 - **Discount factor** – the term $1/(1+r)^t$, where t is the number of periods
 - **Social discount rate** – discount rate used for public policy initiatives based on the social opportunity cost of funds

Adjusting for the Time Dimension of Environmental Benefits and Costs

- **Inflation correction – a magnitude stated in terms of the current period**
 - **Nominal value – a magnitude stated in terms of the current period**
 - **Real value – a magnitude adjusted for the effects of inflation**
 - **Deflating – converts a nominal value into its real value**

Adjusting for the Time Dimension of Environmental Benefits and Costs

- **Summary of Deriving Time-Adjusted Benefits and Costs**
 - **Present value of benefits (*PVB*)** – the time-adjusted magnitude of incremental benefits associated with an environmental policy change
 - **Present value of costs (*PVC*)** – the time adjusted magnitude of incremental costs associated with an environmental policy change

The Final Analysis: Comparing Environmental Benefits and Costs

- **Step One: Determining Feasibility**
 - **Benefit-cost ratio – the ratio of PVB to PVC used to determine the feasibility of a policy option if its magnitude exceeds unity**
 - **Present value of net benefits ($PVNB$) – the differential of ($PVB - PVC$) used to determine the feasibility of a policy option if its magnitude exceeds zero**

The Final Analysis: Comparing Environmental Benefits and Costs

- **Step Two: Decision Rules to Select Among Feasible Options**
 - **Maximize the present value of net benefits (*PVNB*) – a decision rule to achieve allocative efficiency by selecting the policy option that yields greatest excess benefits after adjusting for time effects**
 - **Minimize the present value of costs (*PVC*) – a decision rule to achieve cost–effectiveness by selecting the least-cost policy option that achieves a preestablished objective**

Reservations About the Use of Benefit-Cost Analysis

- **Measurement Problems**

- **Estimation is particularly problematic due to intangibles**
- **Implicit costs**

- **Equity Issues**

- **Distribution of benefits and costs may be highly skewed**

U.S. Government Support of Benefit-Cost Analysis

- **Executive order 12291: Regulatory Impact Analysis (RIA)**
 - **Regulatory impact analysis (RIA) – a requirement under Executive Order 12291 that called for information about the potential benefits and costs of a “major” federal regulation**

U.S. Government Support of Benefit-Cost Analysis

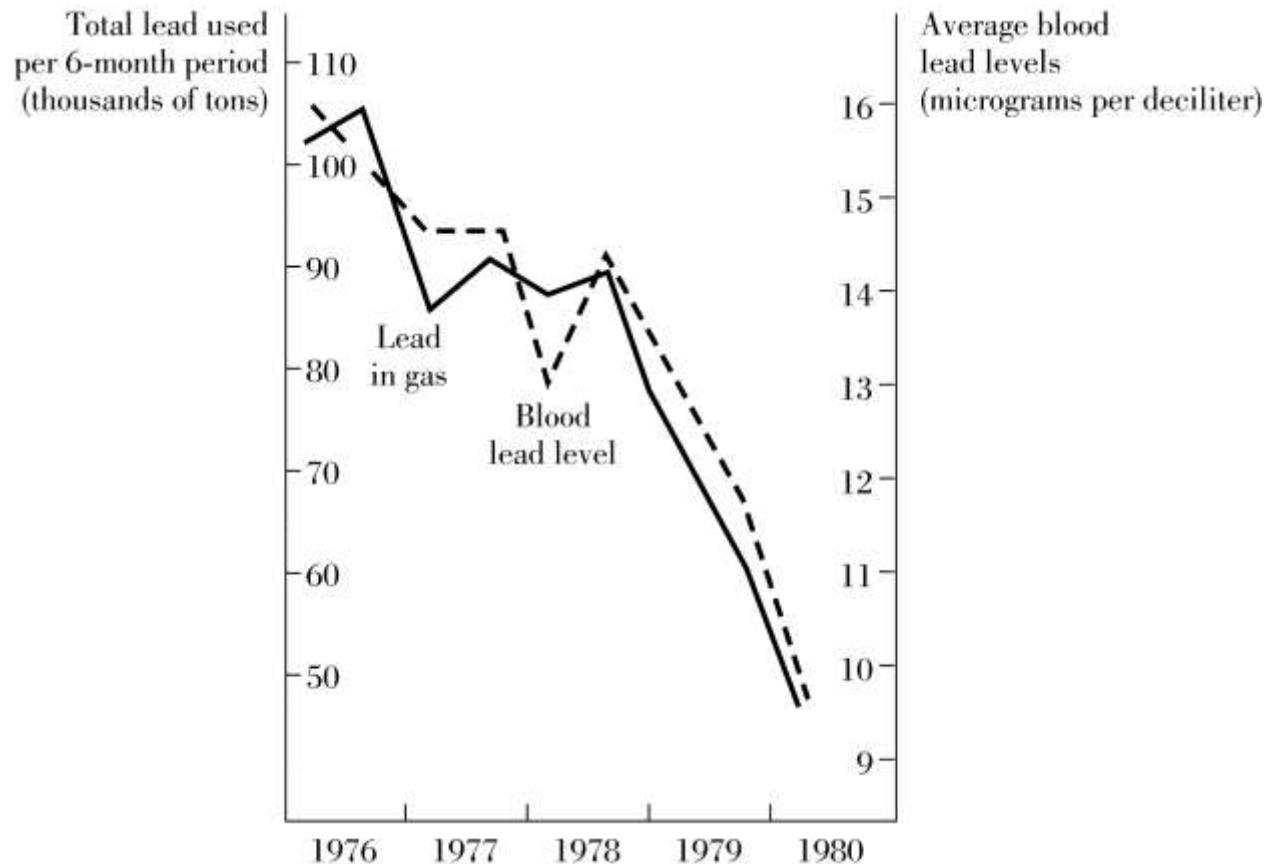
- **Executive order 12866 Economic Analysis (EA)**
 - **Economic analysis (EA) - a requirement under Executive Order 12866 that called for information on the benefits and costs of a “significant regulatory action”**

Reducing Lead in Gasoline: A Regulatory Impact Analysis

- **Estimating the incremental benefits of the lead standard proposal health benefits**
 - **Nonhealth Benefits**
 - Reduction in harmful emissions caused by misfueling (i.e., the use of leaded gasoline in vehicles requiring unleaded gasoline)
 - Lower maintenance costs
 - Increased fuel economy

Reducing Lead in Gasoline: A Regulatory Impact Analysis

Figure 9.1 *Correlation Between Lead in Gasoline and Average Blood Lead Levels*



Reducing Lead in Gasoline: A Regulatory Impact Analysis

- **Estimating the Incremental Costs of the Lead Standard Proposal**
 - **Engineering cost model**
- **Putting It All Together: Benefit-Cost Analysis**
- **The Final Decision**