

# Cost-Benefit Analysis

David Possen

DIS Environmental Economics

# Plan of this lecture

1. Cost-benefit analysis: history
2. Cost-benefit analysis: key steps
3. Why we must discount the future

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# 1. Cost-benefit analysis: history

View

## The Stunning Triumph of Cost-Benefit Analysis

Cass R. Sunstein

13. september 2012 00.30 CEST

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Sept. 13 (Bloomberg) -- It is not exactly news that we live in an era of polarized politics. But Republicans and Democrats have come to agree on one issue: the essential need for cost-benefit analysis in the regulatory process.

In fact, cost-benefit analysis has become part of the informal constitution of the U.S. regulatory state. This is an extraordinary development.

# 1. Cost-benefit analysis: history

Cost-benefit analysis has been used by economists since the 19th century, but its time as part of what Sunstein calls our “informal constitution” is only about as old as ...

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Cost-benefit analysis has been used by economists since the 19th century, but its time as part of what Sunstein calls our “informal constitution” is only about as old as ... me!



# 1. Cost-benefit analysis: history

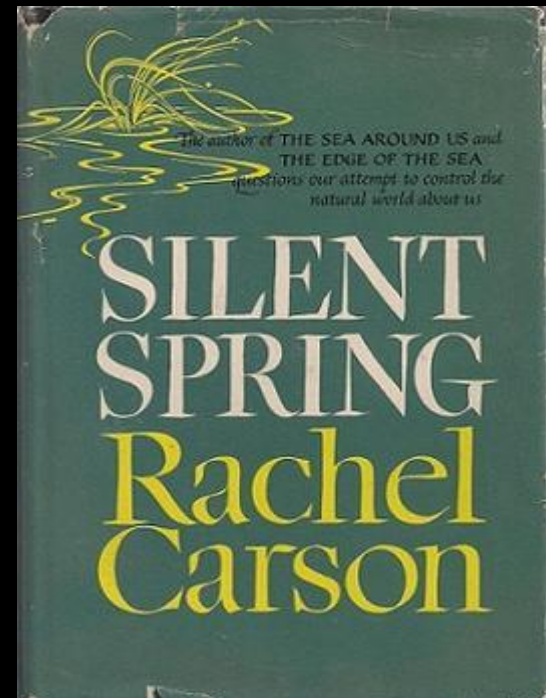


# 1. Cost-benefit analysis: history

It all started with the 1963 book that shook American public policy to its core: Rachel Carson's *Silent Spring*.



Images: Wikimedia Commons, AbeBooks





# 1. Cost-benefit analysis: history

1969: President **Richard Nixon** creates the **Council on Environmental Quality** to oversee environmental impact statements (EISs) for proposed policies (see p. 68).



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1974: President **Gerald Ford** creates the **Council on Wage and Price Stability**, whose job was to identify and publicize economically unsound regulations by government and behavior by firms.

# 1. Cost-benefit analysis: history

Council on Wage and Price Stability

FOR IMMEDIATE RELEASE  
Tuesday, February 12, 1980

600 Seventeenth St. N.W.  
Washington, D.C. 20506

## VI. Conclusion

The Council urges the FAA to reexamine its proposal to increase security requirements for carriers operating small aircraft and for airports serving small aircraft. Because of its potentially severe effect on the commuter air carrier industry, the proposal should be subjected to careful cost-benefit or cost-effectiveness analysis, in order to promote efficient resource allocation in that sector. It would be particularly disruptive

# 1. Cost-benefit analysis: history

1980: President **Ronald Reagan** creates the **Office of Information and Regulatory Affairs** to review the expected benefits and costs of all proposed policies likely to affect the U.S. economy by \$100 million or more.



OFFICE of INFORMATION and REGULATORY AFFAIRS  
OFFICE of MANAGEMENT and BUDGET  
EXECUTIVE OFFICE OF THE PRESIDENT

**Reginfo.gov**

# 1. Cost-benefit analysis: history

1980: President **Ronald Reagan** creates the **Office of Information and Regulatory Affairs** to review the expected benefits and costs of all proposed policies likely to affect the U.S. economy by \$100 million or more.

1993: President **Bill Clinton** issues **Executive Order 12866**, which establishes the principle (still in force!) that government does BCA before all major regulation.

# 1. Cost-benefit analysis: history

## Executive Order 12866 of September 30, 1993

### **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).** ...

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## 2. Cost-benefit analysis: key steps

1. Defining the project or policy to be analyzed
2. Identifying impacts
3. Valuing impacts
4. Comparing benefits and costs
5. Issuing a policy recommendation



## 2. Cost-benefit analysis: key steps

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**Specify its main elements:**  
**Location, timing, groups involved, connections to other programs, and baseline analysis (“with and without principle” – p. 56).**

## 2. Cost-benefit analysis: key steps

1. Defining the project or policy to be analyzed
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**Specify inputs & outputs**  
**—and remember to**  
**include secondary outputs**  
**(except when the primary**  
**outputs just rearrange**  
**existing resources – p. 56)**

## 2. Cost-benefit analysis: key steps

1. Defining the project or policy to be analyzed
2. Identifying impacts
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**Value all impacts, “tangible” as well as “intangible” (p. 56), in commensurable (monetary) terms, as marginal social costs and benefits; this requires discounting.**

## 2. Cost-benefit analysis: key steps

1. Defining the project or policy to be analyzed
2. Identifying impacts
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**This requires discounting,  
so that cost and benefit  
NPVs (net present values)  
can be compared to each  
other head-to-head.**

## 2. Cost-benefit analysis: key steps

1. Defining the project or policy to be analyzed
  2. Identifying impacts
  3. Valuing impacts
  4. Comparing benefits and costs
  5. Issuing a policy recommendation
- According to what Sunstein calls our “informal constitution,” regulations may be adopted in the U.S. if and only if it can be shown that benefits justify costs!**

## 2. Cost-benefit analysis: key steps

Remember that the goal of BCA is to find **efficient** solutions that generate the greatest net benefit to society.

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If this is too difficult to determine, we can aim for the most **cost-effective** solution by means of **optimization** (i.e., finding the cheapest way to reduce pollution by a fixed amount – see p. 67).

## 2. Cost-benefit analysis: key steps

Remember that the goal of BCA is to find **efficient** solutions that generate the greatest net benefit to society.

If this is too difficult to determine, we can aim for the most **cost-effective** solution by means of **optimization** (i.e., finding the cheapest way to reduce pollution by a fixed amount – see p. 67).

And if that too is too difficult to determine, then we can rely on **impact assessment**, in which we take a **qualitative** look at the other measures on President Clinton's list: “**economic, environmental, public health and safety, and other advantages; distributive impacts; and equity.**” (For Nixon's prior list, see p. 68.)



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### 3. Why we must discount the future

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- Accordingly, future costs and benefits (FVs, “future values”) must be recalculated as equivalent NPVs (“net present values”).

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### 3. Why we must discount the future

#### *How discounting works*

Because project costs and benefits normally fall at *different* points in time, we must recalculate their FVs (future values) as equivalent NPVs (net present values):

$NPV = FV / (1 + r)^n$ , where  $r$  = rate,  $n$  = timespan

Note that, all things being equal, higher discount rates ( $r$ ) yield lower NPVs, as do longer timespans ( $n$ ).

### 3. Why we must discount the future

- The costs and benefits of particular projects normally fall at *different* points in time.
- Accordingly, future costs and benefits (FVs, “future values”) must be recalculated as equivalent NPVs (“net present values”).
- All things being equal, higher discount rates yield lower NPVs, as do longer timespans.

## 2. Why we must discount the future

This raises an important topic to which we will return later in the course: disorders of discounting.

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*What happens when we discount the future too much?*

(Answer: we “borrow happiness from the future.”)



Doughnut burger, Wikimedia Commons



### 3. Why we must discount the future

This raises an important topic to which we will return later in the course: disorders of discounting.

*What happens when we discount the future too little?*

(Answer: “Cat’s in the Cradle” syndrome.)



Images: Cindy Funk, Wikimedia Commons



# Example: Skjern river restoration

Discount rate	3%	5%	7%
Project costs	143.7	143.0	142.2
Operation and maintenance	17.0	14.9	14.7
Forgone land rent	75.8	52.5	41.3
<b>Total costs</b>	<b>236.5</b>	<b>210.4</b>	<b>198.2</b>
Saved pumping costs	12.1	7.4	5.4
Better land allocation	29.7	19.4	15.2
Reed production	10.1	5.0	3.0
Miscellaneous benefits	5.0	2.4	1.3
Reduction of nitrogen and phosphorus	56.7	34.0	24.3
Reduction of ochre	40.5	27.0	21.3
Improved hunting opportunities	15.3	9.0	6.3
Improved fishing opportunities	89.0	52.4	36.7
Outdoor recreation	120.1	70.7	49.6
Non-use value of biodiversity	85.9	50.6	35.5
<b>Total benefits</b>	<b>464.2</b>	<b>277.6</b>	<b>198.6</b>
<b>Net benefits</b>	<b>228</b>	<b>67</b>	<b>-1</b>

*Table 5: Cost-benefit results of the Skjern River project*

Source: Alex Dubgaard et al., "Cost-benefit analysis of the Skjern river restoration in Denmark," in R. Brouwer and D. Pearce, eds., *Cost-Benefit Analysis and Water Resources Management* (Elgar, 2003)