

---

# Implications of Relying on Weak Epidemiological Associations

---

Richard B. Belzer, PhD  
Regulatory Checkbook  
Mt. Vernon, VA  
2004 SRA Annual Meeting



## Why Regulate Based on Weak Association?

- *Dirksen Principle.*
- *It's Only Money Principle.*
- *Enlightened Utilitarianism Principle.*
- *Precautionary Principle.*
- *Equity Principle.*

### **The Dirksen Principle**

- “A billion here, a billion there, pretty soon it adds up to real money.”
- Very small individual effects multiplied across very large populations are large impacts.
- Focuses solely on benefits side of ledger (exactly contrary to Dirksen’s context).

### **It's Only Money Principle**

- Public health benefits are what matter; costs do not.
- But “cost” is not the same thing as “expenditure.” “Cost” means “opportunity cost,” and “opportunity cost” means “benefits foregone”.
- THEREFORE, to say that “it’s only money” that is sacrificed in order to achieve public health benefits ignores the value of benefits that must be foregone in order to have these public health benefits.
- What are these other benefits that must be foregone? They could be any number of things—housing, clothing, fuel, education, or goods and services that enhance health.

### **Enlightened Utilitarianism**

- All errors entail social costs.
  - Type I error: interpreting a weak association as meaningful when it isn’t
  - Type II error: interpreting a weak association as meaningless when it isn’t
- Under Enlightened Utilitarianism, the social cost of Type I error IS PRESUMED TO BE LESS THAN social cost of Type II error.

### **Precautionary Principle.**

- The Precautionary Principle appeals to humans’ innate risk aversion. “Better to be safe than sorry.”

### **Equity Principle**

- Needs a definition of “equity”. Examples might include “equal absolute or relative risk reduction” or “equal residual risk,” but the array of possible definitions is unbounded—including “equal sharing of the burden of risk management”.
- Given any definition, action based on weak association IS ASSUMED TO ENHANCE OR ACHIEVE equity.

## Proposed Principles Are Individually Inconsistent

- |   |   |
|---|---|
| ■ <i>Dirksen Principle</i>                    | ■ Not applied to cost   |
| ■ <i>It's Only Money Principle</i>            | ■ Ignores foregone benefits                                     |
| ■ <i>Enlightened Utilitarianism Principle</i> | ■ Assumes cost of Type I errors exceeds cost of Type II errors. |
| ■ <i>Precautionary Principle</i>              | ■ Risk-loving with respect to other risks                       |
| ■ Equity                                      | ■ Subjective  |

### Dirksen Principle

- Small costs borne by a large population also yields large aggregate costs.
- If costs are ignored, by what principle are benefits per se more important? Probably the *It's Only Money Principle*!

### It's Only Money Principle

- Health and safety benefits matter; costs do not.
- This principle is based on a false premise and an extremely hubristic assumption:
  1. Cost is "merely" money. But "cost" means "benefits foregone", so the *It's Only Money Principle* ignores health and safety benefits that must be foregone in order to have the public health benefits associated with taking action based on the weak association.
  2. Health and safety benefits as we experts value them are superior to other goods and services as others value them. Public health professionals may believe this, but there is little or no evidence that the public itself believes this. People quite routinely make choices contrary to the advice of us experts. Therefore, this principle assumes that our values are right and the public's values are wrong.

### Enlightened Utilitarian Principle

- The social cost of rejecting the null when it is true (Type I error) IS ASSUMED TO BE LESS THAN the social cost of accepting the null when it is true (Type II error).
- No universal rule applies to the relative magnitude of loss functions, so no conclusion can be drawn without sophisticated analysis.
- If empirically validated, then this principle is the same as Kaldor-Hicks criterion (K-H improvement if aggregate benefits exceed aggregate costs; K-H efficiency obtains if no reallocation of resources improves net welfare).
- But advocates of the Enlightened Utilitarian Principle generally are not proposing the application of Kaldor-Hicks.

### Precautionary Principle

- Specific-risk risk aversion is inherently risk-loving with respect to other risks that often have not been clearly identified.
  - The Precautionary Principle appeals to humans' innate risk aversion.
  - If we were not risk averse by nature, the public would not think much of a principle founded on precaution.
- There is a huge literature in economics on risk aversion
  - However, economic definitions for the Precautionary Principle are awkward because the principle is subjectively defined.
  - I offer the following general economic definition that I think captures all subjective definitions:
    - When faced with a large number of possible alternative allocations of a scarce resource, the Precautionary Principle requires the application of a higher degree of risk aversion with respect to the uncertainties concerning a specific a specific risk than to risks generally.
    - The greater the gap between the amount of general risk aversion and the level of risk-specific risk aversion, the more stringent the implied intensity of the Precautionary Principle. Thus, the Precautionary Principle has a lower limit of zero but no upper bound. For every positive level of precaution one might choose, both weaker and stronger levels are feasible.
- Being relatively precautionary with respect to any specific risk implies being relatively risk loving with respect to other risks. The greater the gap between the amount of general risk aversion and the level of specific-risk risk

## Proposed Principles Are Collectively Inconsistent

- Asymmetry in application
  - Weak negative associations are equally likely of being true but rarely, if ever, advanced as the basis for regulation.
- Adjustments for uncertainty
  - Risks: uncertain
  - Benefits of regulation: doubly uncertain
  - Costs of regulation: certain
- Effects of risk aversion on valuation

### ASYMMETRY THE APPLICATION

- *Ceteris paribus*, statistically significant weak negative associations have equal plausibility of being correct.
- Weak negative associations are rarely, if ever, advanced as the basis for regulatory action.

### ADJUSTMENTS FOR UNCERTAINTY

- Risks remain uncertain because they are founded only on statistical significance
- The existence of benefits of regulation are doubly uncertain. Why?
  - There remains inherent uncertainty about whether the risk is real. If it is not, then regulatory action cannot yield social benefits except by accident.
  - This uncertainty is compounded by additional uncertainty concerning the effectiveness of regulatory intervention, which is rarely if ever as effective as promised, and often riddled with unintended consequences (including unintended risks).
- The existence of direct costs from regulatory intervention is certain.
  - Resources must be reallocated from their current highest and best use toward the alternative use.
  - This reallocation entails opportunity costs, which recall means benefits foregone.
- The existence of indirect costs (e.g., risk-risk effects) is uncertain, but often highly plausible and predictable.

### EFFECTS OF RISK AVERSION ON VALUATION

- There seems to be widespread confusion about the effect of risk aversion on value.
  - Risk aversion leads individuals to reduce their willingness to pay below expected value for uncertain regulatory benefits.
  - Leads individuals to increase willingness to pay above expected value avoid uncertain regulatory costs.
- Therefore, the social value of regulatory intervention based on weak association is small precisely because it is uncertain, and individuals are willing to pay less to reduce an uncertain risk of fixed magnitude than a certain one.

# Parallel Inconsistencies in Regulatory Economics

- Altruism (WTP for benefits to others)
  - WTP for *Schadenfreude*
  - WTP for social costs (e.g., low unemployment)
- Indirect effects
- Discounting (rate of time preference)
  - Failure to discount benefits
  - $R(b) < R(c)$
- Lagging

## ALTRUISM

- Willingness to pay for others to receive benefits
- Practical problems arise when one attempts to count altruism; for example:
  - Measurability
  - Circularity (WTP of A for B + WTP of B for A), absence of definable stopping points.
- Theoretical problems; for example:
  - *Schadenfreude* value (i.e., WTP for others to bear costs or to be denied benefits)
    - Just as real and genuine as altruism, and there is at least much empirical evidence for it
    - opponents of counting *Schadenfreude* value in a public health context (i.e., WTP for “undeserving” individuals to experience harm) might support counting it in an employment context (i.e., WTP for low unemployment).
    - Even staunch public health advocates often exhibit *Schadenfreude* value with respect to certain individuals (e.g., smokers, gluttons, misogynists, Republicans, etc.).
    - There is no economic basis for counting one but not the other
  - Appeals to morality do not help because mathematically equivalent but much more socially acceptable versions of *Schadenfreude* value also exist but are not counted (e.g., willingness to pay for low unemployment).

## INDIRECT EFFECTS

- Theory is clear:
  - *Benefits are based on willingness to pay except where affected party owns a property right*
  - *Costs are based on opportunity costs (i.e., benefits foregone)*
- Regulatory practice does not always follow theory
  - Benefit estimates sometimes are based on willingness to accept. WTA is appropriate only when the individual whose valuation is being sought has a clear property right.
  - Costs are never based on opportunity costs

## DISCOUNTING

- Discounting theory is clear in part and murky in part:
  - Clear: Benefits and costs must be discounted at the same rate of time preference.
  - Murky: Should the RTP be a “social” or private rate of discount?
- Discounting theory is routinely applied inconsistently in regulatory contexts.
  - Advocates of public health regulatory intervention generally seek the lowest feasible discount rate on benefits (often zero), and a lower rate on health and safety benefits than on costs.
  - Alternatively, they assert that discounting is immoral (e.g., Heinzerling).
  - These principles reverse when the issue is development with environmental implications (e.g., dams, roads).

## LAGGING

- Lagging theory is clear
  - If the biological mechanism is known, benefits accrue according to that mechanism

# “Principled Inconsistency”

“A foolish consistency is the hobgoblin of little minds...”  
(RW Emerson)

- Asymmetries in incidence
- Ideological motivations
- Rentseeking

## EMERSON

*“A foolish consistency is the hobgoblin of little minds, adored by little statesmen and philosophers and divines. With consistency, a great soul has simply nothing to do. He may as well concern himself with the shadow on the wall. Speak what you think now in hard words and to-morrow speak what to-morrow thinks in hard words again, though it contradict every thing you said to-day. --‘Ah, so you shall be sure to be misunderstood.’ -- Is it so bad then to be misunderstood? Pythagoras was misunderstood, and Socrates, and Jesus, and Luther, and Copernicus, and Galileo, and Newton, and every pure and wise spirit that ever took flesh. To be great is to be misunderstood.”*

### Asymmetries in incidence

- Asymmetries in the incidence of social costs and social benefits lead to regulatory interventions that otherwise would receive little or no public support. If I gain a large share of the benefits but bear a tiny fraction of the costs, all I care about is whether my large share of the benefits exceeds my tiny share of the costs.
- Where benefits and costs are entirely co-located it is hard to find examples where weak associations lead to exuberant decision making.
  - Examples that do exist (e.g., creative torts) are better characterized as either judicial recourse for buyer's regret (e.g., product liability) or rentseeking (i.e., reallocation of resources).
  - Public support for regulatory intervention based on weak association is concentrated among potential beneficiaries; support will persist as long as potential benefits exceed the infinitesimal cost share.

### IDEOLOGICAL MOTIVATIONS

- People who seek to change the world may be willing to bear disproportionate personal burdens (e.g., Ralph Nader is reputed to never have owned a car).
- However, the US general public is weakly ideological and tends to be distrustful of ideologues. However, the public often is highly susceptible to their moral intimidation. (This is why most people recycle, or feel guilty about driving their SUVs.)

### RENTSEEKING

- Epidemiologists probably have discovered most of the low-hanging fruit. As it gets harder and harder to find problems, there is a natural temptation to lower the standard by which something is big enough to be considered a “problem”.
- Scientists and others often profit financially, corporately and professionally from finding problems.
  - Getting published.
  - Getting grants, expanding their research centers.
  - Earning tenure, the respect of peers.
  - Garnering public prestige and influence.
- Rentseeking is a dangerous activity for scientists. The public strongly supports scientists as long as they remain “pure”. Revelation that they are “in it for the money” or the prestige, etc., undermines their credibility. (This is why activists groups disparage scientists who do consulting, especially for industry, even where there is no evidence that scientists have altered their standards. As Heinzerling said about me this morning, an OMB economist does not need to be told to insert bias into benefit-cost analysis.)