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Disinfecting Cost-Benefit Analysis of Hidden Value-Laden Constraints

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Value Judgments in CBA are Either Covert or Overt: "Try, or try not: there is no don't"

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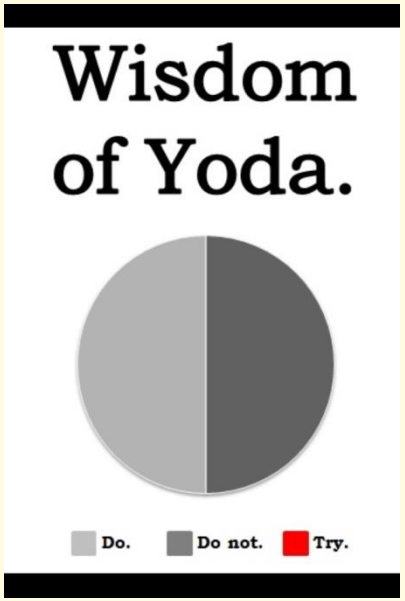
What is said

- We "let the science speak" and use expected values of risk, cost, and net benefit.
- We don't treat people differently according to their incomes.
- We are indifferent to how old people are.

What is done

- We insist that similar errors of needless compliance spending and needless (monetized) human suffering be treated as exactly equal.
- We treat a cost equal to 0.0001% of A's wealth the same as if it took half of B's wealth.
- We spend as much to lengthen a life by 50 hours as by 50 years.



Value Judgments in CBA are Either Covert or Overt: "There is no don't" (cont.)

What is said

- We seek to maximize net total benefit, because in theory, the winners can compensate the losers and society will be better off (Kaldor-Hicks efficiency)
- Total benefit is a function of the "# of lives saved" (average risk times population size)
- Total cost is "all the money in one big pile"

What is done

- Compensation cannot even occur IN THEORY, because we deliberately avoid learning *who* the winners and losers are!
- Sometimes risks below 10^{-6} are "rounded down" to zero; but more importantly, we generally do treat 200,000 people facing a risk of 10^{-5} as more dire than 199 people facing a risk of 10^{-2}.
- Therefore, there is no analogous concept of "*de minimis* cost" (300 million increments of $6 $^{(*)}$ = $1.8 billion). But we often do NOT ignore concentrated costs as we do with risks. [* $6= monetized value of a risk of 10^{-6}, assuming VSL=$6 MM]

There are at least five kinds of "invisible value judgments":

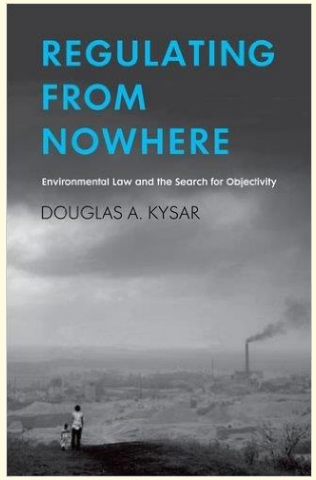
(1) Setting unequal things as equal to each other;

(2) Insisting on averages;

(3) Imposing linear relationships;

(4)Inserting zeroes rather than blanks;

(5) Asserting that part of the picture is the whole picture



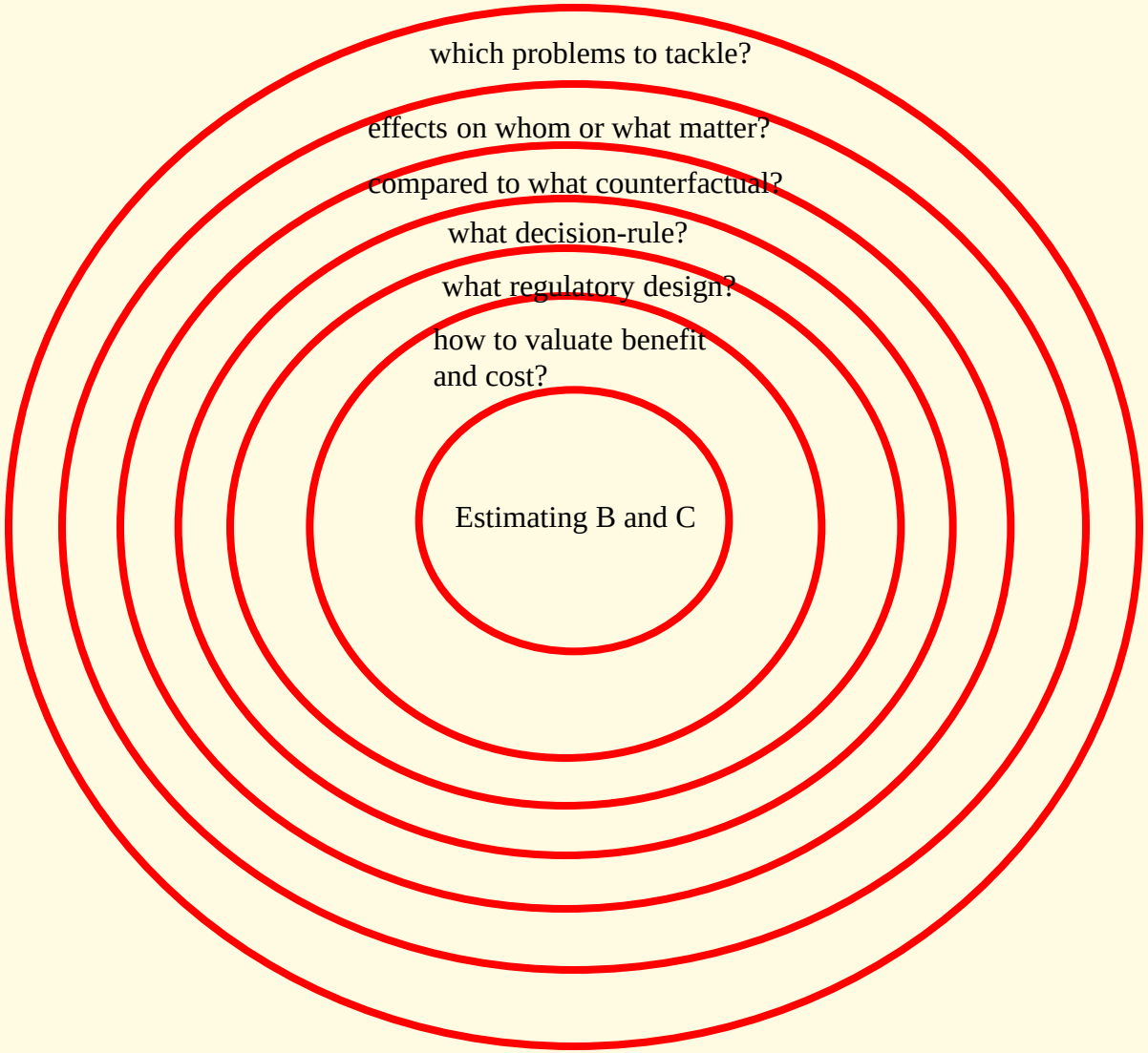
Overt v. Covert Across the Science-Economics Disciplinary Divide:

"Their perceptions may be so far from reality that you and I know that they're absurd, but that's how they feel about it and that's the way they perceive things. So, in discussing the subject [of risk], we really have to distinguish between the reality of what may or may not occur, the analysis of it, and our perception of it."

- Chauncey Starr, in Schwing and Albers, 1980

"Yet, like most economists, I don't view the study of economics as laden with ideology. Most of us agree with Keynes, who said: "The theory of economics does not furnish a body of settled conclusions immediately applicable to policy. It is a method rather than a doctrine, an apparatus of the mind, a technique for thinking, which helps the possessor to draw correct conclusions."

- Greg Mankiw, *NY Times*, 12/3/2011


which problems to tackle?
effects on whom or what matter?
compared to what counterfactual?
what decision-rule?
what regulatory design?
how to valuate benefit and cost?
Estimating B and C

Risk= Probability x Severity OF WHAT?

(misleading over-aggregation)

"When environmental activists suggest that consumers not eat a healthy protein like seafood, they're doing more harm than good."

--Gavin Gibbons, National Fisheries Institutes, *NYT* 3/17/14

risk(tuna) >> risk (meat) >> risk(salmon)

"If I had a son, I'd love to have him play the game of football because of the values you get. *There is risk in life. There is risk in sitting on the couch."*

--Roger Goodell, NFL Commissioner, 2/6/16 press conference

"There's almost no food that isn't genetically modified. Genetic modification is the basis of all evolution."

--Nina Federoff, science advisor to Sec. Hilary Clinton, 2008

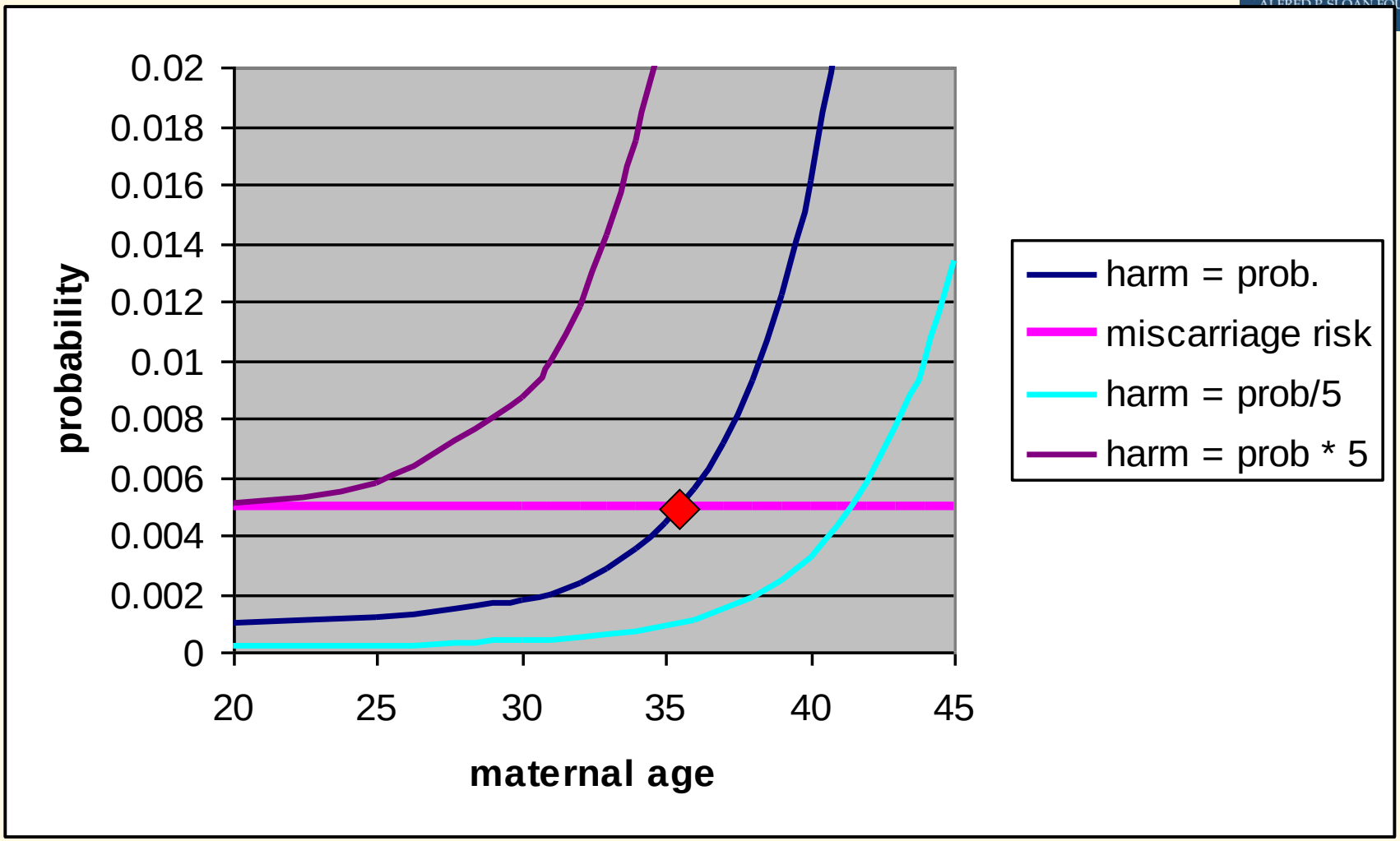
Severity:

$X \neq Y$ (wholly different outcomes are not "equal")
$X \neq X'$ (similar outcomes may not be equal)

Probability:

$[p_1(r_1), p_2(r_2)] \neq (p_1+p_2)/2\ ((r_1+r_2)/2)$
$[p_{1i}(r_1), p_{1j}(r_1)] \neq (p_{1i}+p_{1j})/2(r_1)$

The Tyranny of Invisible Equal-Weighting: The Case of Amniocentesis Guidelines



Pitfall: treating outcomes that <u>appear</u> similar as if they were identical.

September 11's indirect toll: road deaths linked to fearful flyers

German professor estimates an extra 1,595 Americans died in car accidents in year after September 11 attacks

Never Bitten, Twice Shy: The Real Dangers of Summer

DAVID ROPEIK AND NIGEL HOLMES

August, the peak of summer vacation season, a time for rest, relaxation and, well, risking our lives. Warm weather and free time entice many Americans to do things that increase the chances we will be seriously injured — but do we fear the right ones? When asked in the abstract about the term "risk," Americans correctly tend to talk in terms of statistical probability, about the chances that something bad will happen. Yet when they are faced with specific threats, emotion overrules logic pretty quickly — we fear the unlikely and are relatively unconcerned about the truly dangerous.

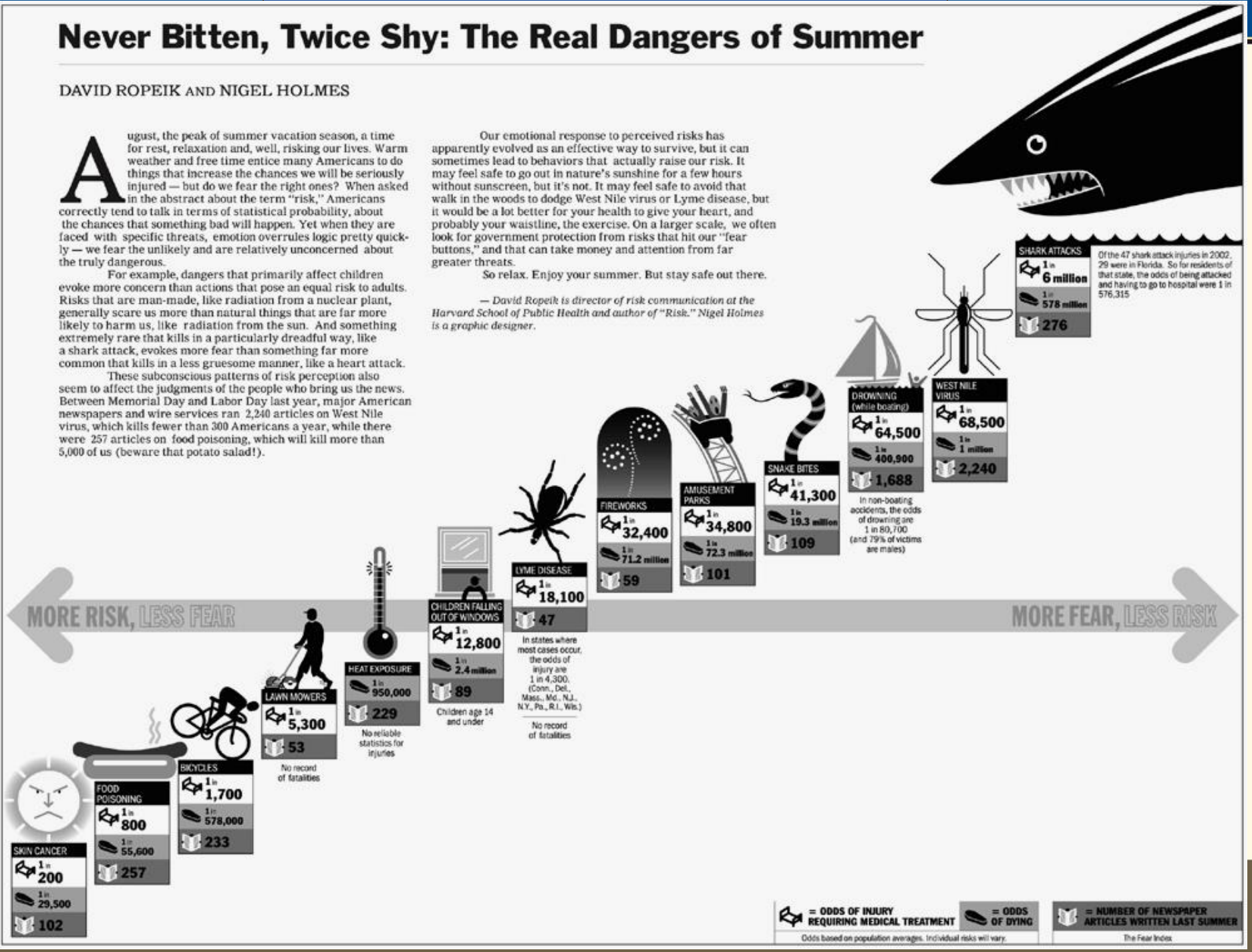
For example, dangers that primarily affect children evoke more concern than actions that pose an equal risk to adults. Risks that are man-made, like radiation from a nuclear plant, generally scare us more than natural things that are far more likely to harm us, like radiation from the sun. And something extremely rare that kills in a particularly dreadful way, like a shark attack, evokes more fear than something far more common that kills in a less gruesome manner, like a heart attack.

These subconscious patterns of risk perception also seem to affect the judgments of the people who bring us the news. Between Memorial Day and Labor Day last year, major American newspapers and wire services ran 2,240 articles on West Nile virus, which kills fewer than 300 Americans a year, while there were 257 articles on food poisoning, which will kill more than 5,000 of us (beware that potato salad!).

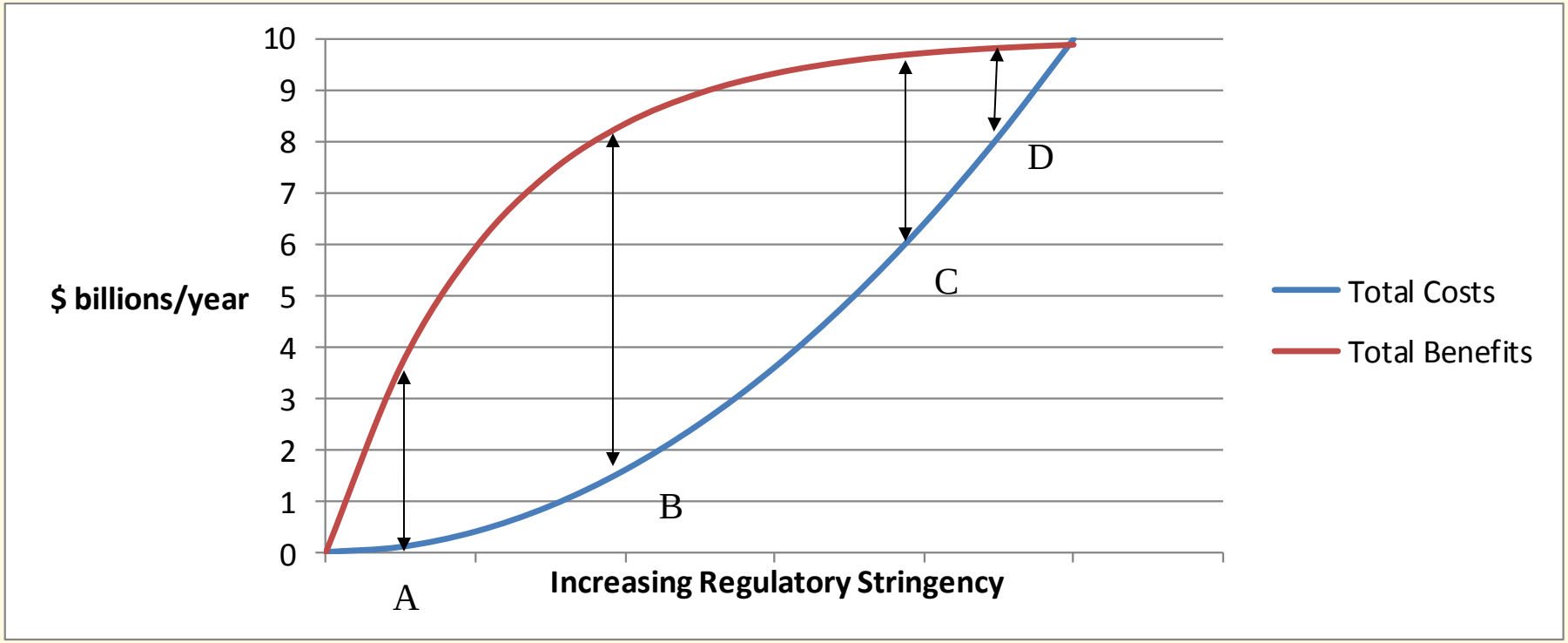
Our emotional response to perceived risks has apparently evolved as an effective way to survive, but it can sometimes lead to behaviors that actually raise our risk. It may feel safe to go out in nature's sunshine for a few hours without sunscreen, but it's not. It may feel safe to avoid that walk in the woods to dodge West Nile virus or Lyme disease, but it would be a lot better for your health to give your heart, and probably your waistline, the exercise. On a larger scale, we often look for government protection from risks that hit our "fear buttons," and that can take money and attention from far greater threats.

So relax. Enjoy your summer. But stay safe out there.

— David Ropeik is director of risk communication at the Harvard School of Public Health and author of "Risk." Nigel Holmes is a graphic designer.

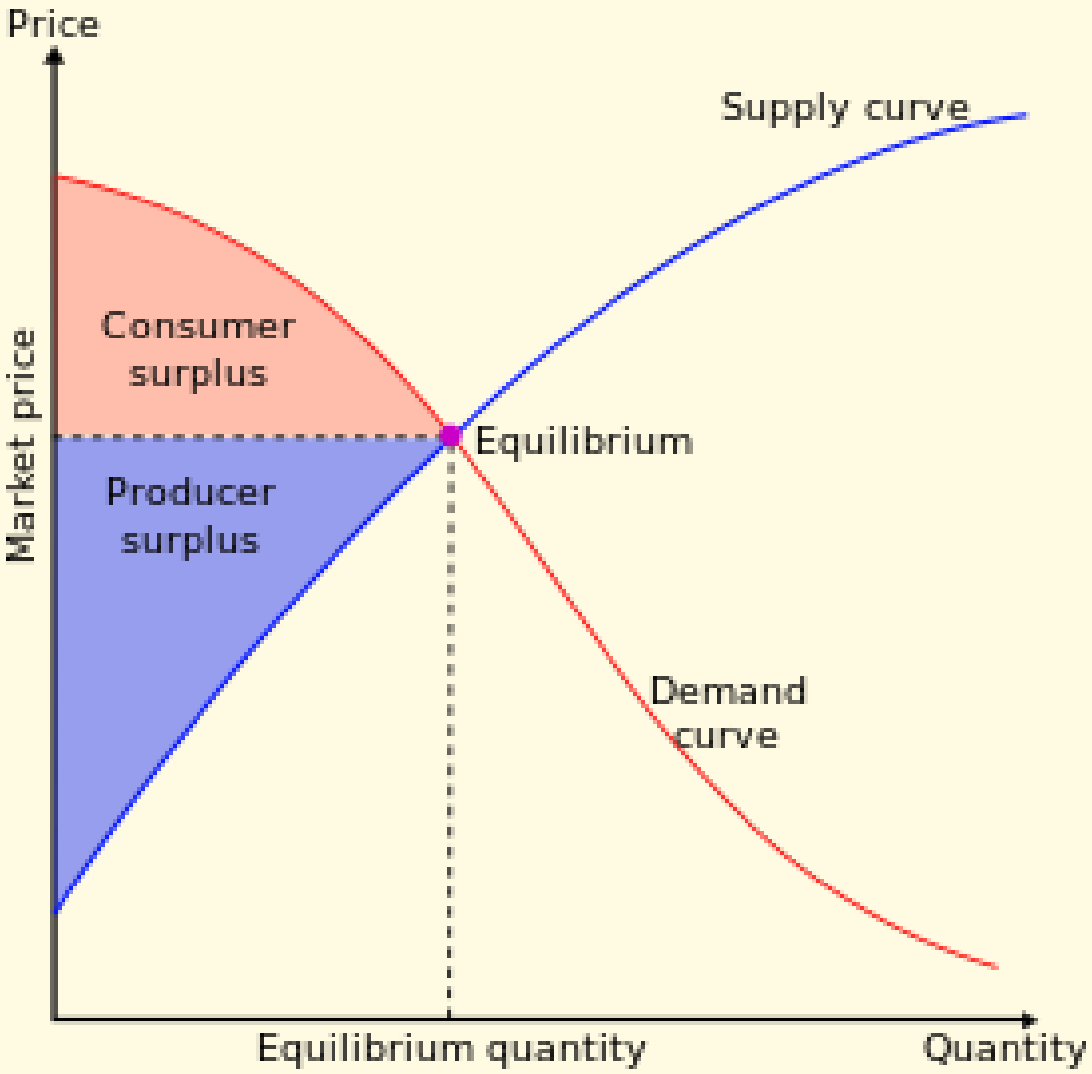


Four different levels of regulatory stringency



(options A and C have = net benefit; B has maximal NB; D has maximal ***total*** benefit but still has B > C)

"Efficiency" is often equated with "the lowest cost for a given level of risk reduction"– but why not "the greatest risk reduction for a given (tolerable) level of cost"??


Price
Supply curve
Consumer surplus
Market price
Equilibrium
Producer surplus
Demand curve
Equilibrium quantity
Quantity

Actual (2006) Regulation: OSHA Requires Employers to Reduce Chromium-VI from 52 $\mu g/m^3$ to 5 $\mu g/m^3$:

Seems "objective": annual benefits (discounted at 3%) are $504 million (about 90 lung cancer deaths averted), with costs of $273 million, for net benefits of $231 million. Also, net benefits are < $231 million for alternative exposure limits of 10 $\mu g/m^3$ or 0.5 $\mu g/m^3$.

BUT…

- Why Cr-VI, not silica, beryllium, ergonomics, combustible dust?
- Why benefits/costs to US workers only? Why over 20 years? Why 3% discount?
- Why maximize net benefit (vs. maximize total benefit subject to "acceptable cost"?
- Why a limit, not a ban?
- Why control the substance, not each industrial use thereof (some of which don't need Cr-VI, some of which would use more toxic substitutes, some of which would lead to shutdowns?)
- Why use CBA, as opposed to P2, scenario analysis, all-feasible-controls?
- Why calculate E(B-C), as opposed to $\int NB\ p(NB)$?

- Why estimate (B-C), as opposed to $\sum b_i - c_i$?
- Why dictate performance, as opposed to specific controls, or submission of a tailored plan?
- Why enforce via civil penalties, as opposed to criminal ones?
- Why exempt certain sectors (Portland cement) entirely?
- Why define B as (VSL * ΔL), as opposed to sum of QALYs?
- Why estimate VSL via revealed-preference methods?
- Why model risk over a 45-year working lifetime, as opposed to 20, or 60 years?
- Why assume all workers are equally susceptible to lung cancer?

Hypothetical Regulation: FDA Decides to Approve the Release of GM (dominant-lethal) Mosquitoes to Combat Zika Virus in Florida

Decision embodies these kinds of values, among others:

- Worthwhile to analyze, conduct process, and rule on *this* proposal:
- It's better for [current US residents] to have GM mosquitoes in the environment than not;
- It's better *because* their [expected longevity] is estimated to increase with the release;
- It's better because [total benefits exceed total losses], despite the fact that [some][the majority of] *individual* impacts have loss>benefit;
- It's better than [not approving it][the current best alternative]
- Etc.

The "As You Wish, Sir" Way to Manipulate Choice:

"This Regulation is the Best Course of Action because…"

"This New Technology Should be Embraced because…"

"It generates benefits (maximally) in excess of its costs."

"It reduces expected mortality compared to the current technological leader"

Instead, How About…

- "Of all the things we could regulate this year, we chose this hazard, this kind of regulation, and this level of stringency because […..]"
- "The net benefits accrue to U.S. adults, between now and 2026 (effects on other people, other time periods, other species are not considered)"
- "Other options would save more lives, and generate positive net benefits, but this option has *marginal* costs always in excess of benefits"
- "Different controls would save more younger citizens, but fewer older ones"
- "Different controls would avert fewer expected deaths, but eliminate all risks above one change in 100"
- "Different controls would 'cost more,' but would not impose costs on the poorest Americans"
- "A different design would have a 20% chance of saving an extra 1,000 lives, but on average would save 5 fewer lives than the option chosen"