Governing Risk-Risk Tradeoffs

Jonathan B. Wiener
Perkins Professor of Law, Professor of Environmental Policy & Public Policy,
Duke University;
University Fellow, RFF;
Past President, SRA

CRAG-IRGC Symposium
EPFL, Lausanne
22 November 2013

All slides © 2013 Jonathan B. Wiener. Do not copy or distribute without permission.
Outline of the presentation

1. From single risk to multi-risk
2. Risk-Risk tradeoffs: analysis and examples
3. Full portfolio impact analysis
5. Solutions for governing risk-risk? Progress and challenges
6. Risk-Risk and Precaution: normative and comparative
Traditional Approach: one Target Risk (TR)

Key questions in risk analysis of the TR
2. What should be done about the risk? Risk Management (RM): Policy making including comparing costs, benefits, uncertainties, etc. of alternative policy options.
3. How well will (or did) the policy work? Review and Evaluation. Oversight, learning, updating.
Reality: Multiple Risks

Multiple risks means:
- Priority-setting: triage
- Ancillary risks: iatrogenic
  - co-benefits
  - countervailing harms

Multiple actors …

- Not just 1 risk at a time
- The world is a web of multiple interconnected risks
- Uncertainties on all sides
Risk-Risk: through history and across disciplines

- Odysseus confronts Scylla vs. Charybdis
- Medicine: side effects (iatrogenic injury)
  - Hippocrates, 400 B.C.: “First, do no harm” (too strict?)
  - Ignatz Semmelweiss, 1840s: exhorts doctors to wash their hands
  - Joseph Lister, 1860s: antisepsis for surgery
- Ecology: interconnectedness
  - John Muir, 1869: “When we try to pick out any one thing, we find it hitched to everything else in the universe.”
- Economics: externalities
  - A.C. Pigou, 1920: Harms of decisions that neglect full social impacts
- Systems analysis
- Impact assessment: Consider impacts before acting
- Military strategy: Collateral damage, blowback
  - Barbara Tuchman: The March of Folly
Risk-Risk: an emerging regulatory tool

- OMB Circular A-4, section on “Ancillary Impacts,” 2003
- Graham & Wiener debate with Hansen, Krauss & Tickner in JRR, 2008

Key points:
- Governments are endogenous, imperfect institutions (as are markets)
- We live in a complex web of multiple interconnected risks
- Policy interventions can both reduce risks and create risks
Insights from seeing Regulation as Medicine

• Society as patient, Risk as ailment, Regulation as therapy

• Triage: priority among risks
• Iatrogenesis: therapy can both heal & harm
  • Aspirin, surgery, vaccines . . .
  • Iatrogenic risks are real risks (USA: 100k +)

• “Treat the whole patient” – have a “primary risk manager” to monitor the full “system.”
  • “Full portfolio impact assessment”
  • Council of Risk Analysts, Country risk officer, National Risk Board.

• “Risk-superior moves” to reduce multiple risks in concert
  • Confronting R-R spurs innovation
  • e.g. hand washing, antisepsis, smart airbags, multi-gas climate policy
RTA: Risk-Risk Tradeoffs and Risk-Superior Moves

Precaution vs. TR (target risk)

Risk-Superior Move

Weigh the Tradeoff

Precaution vs. AR (ancillary risk)

p(TR) = 1

p(AR) = 1
## Risk-Risk Tradeoffs are Pervasive

<table>
<thead>
<tr>
<th>Intervention</th>
<th>TR</th>
<th>CR</th>
<th>(Risk-superior option?)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspirin</td>
<td>Head</td>
<td>Stomach</td>
<td>(Acetaminophen?)</td>
</tr>
<tr>
<td>Toothpaste</td>
<td>Tooth decay</td>
<td>Fluoride poisoning</td>
<td>(warning label)</td>
</tr>
<tr>
<td>Vaccines</td>
<td>Illnesses</td>
<td>Side effects</td>
<td></td>
</tr>
<tr>
<td>Hospitals, surgery</td>
<td>Illnesses</td>
<td>Iatrogenic illnesses</td>
<td>(antisepsis…)</td>
</tr>
<tr>
<td>Mammograms, PSA</td>
<td>Cancer</td>
<td>Fear; unnec. surgery; other cancers</td>
<td></td>
</tr>
<tr>
<td>Antibiotics</td>
<td>Infections</td>
<td>Resistant bacteria</td>
<td></td>
</tr>
<tr>
<td>Chlorinate H₂O</td>
<td>Pathogens</td>
<td>Carcinogens</td>
<td>(Ozonation?)</td>
</tr>
<tr>
<td>Ban DDT</td>
<td>Wildlife</td>
<td>Malaria</td>
<td>(IRS; vaccine; GM)</td>
</tr>
<tr>
<td>Airbags in cars</td>
<td>Adults</td>
<td>Kids</td>
<td>(Kids in back; smart airbags)</td>
</tr>
<tr>
<td>Reduce trop. O₃</td>
<td>Lungs</td>
<td>Skin/UV</td>
<td></td>
</tr>
<tr>
<td>Ban asbestos</td>
<td>Lungs</td>
<td>Highway crashes</td>
<td>(copper brakes?)</td>
</tr>
<tr>
<td>Reduce air pollution</td>
<td>Public</td>
<td>Workers inside factories</td>
<td>(EPA-OSHA)</td>
</tr>
<tr>
<td>Waste cleanups</td>
<td>Public</td>
<td>Workers at cleanup sites</td>
<td></td>
</tr>
<tr>
<td>Suppress forest fires</td>
<td>Some fires</td>
<td>Worse fires</td>
<td></td>
</tr>
<tr>
<td>Control floods</td>
<td>Some floods</td>
<td>Worse floods</td>
<td></td>
</tr>
<tr>
<td>Facility risk disclosure</td>
<td>Accidents</td>
<td>Terrorism</td>
<td>(EPA-FBI)</td>
</tr>
<tr>
<td>Rescue banks (TBTF)</td>
<td>Market panic</td>
<td>Moral hazard</td>
<td>(Dodd-Frank?)</td>
</tr>
</tbody>
</table>
## Risk-Risk Tradeoffs on all sides

<table>
<thead>
<tr>
<th>Intervention</th>
<th>TR</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH&lt;sub&gt;3&lt;/sub&gt; to CFCs (1930s)</td>
<td>Toxicity</td>
<td>Ozone depletion</td>
</tr>
<tr>
<td>CFCs to HFCs (1990s)</td>
<td>Ozone depletion</td>
<td>Climate change</td>
</tr>
<tr>
<td>Coal to Gas</td>
<td>CO&lt;sub&gt;2&lt;/sub&gt;</td>
<td>CH&lt;sub&gt;4&lt;/sub&gt; (= should cover all GHGs)</td>
</tr>
<tr>
<td>Coal to Shale Gas</td>
<td>Air pollution</td>
<td>Water pollution; CH&lt;sub&gt;4&lt;/sub&gt;</td>
</tr>
<tr>
<td>Ban nuclear power</td>
<td>Waste; meltdown</td>
<td>Coal = air pollution; CO&lt;sub&gt;2&lt;/sub&gt;</td>
</tr>
<tr>
<td>MTBE</td>
<td>Air pollution</td>
<td>Water pollution</td>
</tr>
<tr>
<td>Diesel fuels</td>
<td>CO&lt;sub&gt;2&lt;/sub&gt;</td>
<td>PM</td>
</tr>
<tr>
<td>Biofuels (corn ethanol)</td>
<td>CO&lt;sub&gt;2&lt;/sub&gt;; oil imports</td>
<td>N&lt;sub&gt;2&lt;/sub&gt;O; forests CO&lt;sub&gt;2&lt;/sub&gt;; food prices</td>
</tr>
<tr>
<td>CFL lightbulbs</td>
<td>CO&lt;sub&gt;2&lt;/sub&gt;</td>
<td>Hg (replace with LED bulbs?)</td>
</tr>
<tr>
<td>CCS</td>
<td>CO&lt;sub&gt;2&lt;/sub&gt;</td>
<td>Water pollution; seismic</td>
</tr>
<tr>
<td>Geoengineering</td>
<td>Warming</td>
<td>Cooling; ozone depletion; rebound</td>
</tr>
<tr>
<td>Butter to margarine</td>
<td>Saturated fat</td>
<td>Trans-fat (now being banned…)</td>
</tr>
<tr>
<td>Ban foreign blood</td>
<td>BSE/vCJD</td>
<td>Blood shortage</td>
</tr>
<tr>
<td>Feed soy to cattle</td>
<td>BSE/vCJD</td>
<td>Deforestation</td>
</tr>
<tr>
<td>Police chases</td>
<td>Suspects</td>
<td>Bystanders</td>
</tr>
<tr>
<td>War on Drugs</td>
<td>Drug use</td>
<td>Violence</td>
</tr>
<tr>
<td>War on Terror</td>
<td>Terrorism</td>
<td>Terrorism; civilians; privacy; highways</td>
</tr>
</tbody>
</table>
Toward Full Portfolio Impact Analysis

• Simple, single-risk approaches yield errors
  • “Better safe than sorry” vs. “Cure is worse than the disease”

• Real world is complex, interconnected, multi-risk web
  • Confront & weigh the portfolio of Risk-Risk tradeoffs (1, 2, … n)
    • Both ancillary countervailing risks (CRs) and ancillary co-benefits (ABs)
    • Differences in type, timing, population, etc. = challenge of comparing
    • Seek “Risk-Superior” moves

• PP: Max(ΔTR)
  • unless qualified by “cost-effective” or “proportionate”

• BCA: Max(ΔTR - Cost)
  • can worsen risk-risk tradeoffs, if TR and cost are narrowly defined

• RTA: Max(ΔTR – ΔCR)
  • = reduce overall risk

• Full portfolio: Max(ΔTR – ΔCR + ΔAB - Cost) (… all important impacts)

• But, increases costs of deliberation. How many ripples to assess? …
Figure 1.1. Trend in RIA adoption across OECD jurisdictions

Source: OECD, RIA as a Tool for Policy Coherence 15 (2009).
Optimal Portfolio Analysis: How Many Ripples?

• Ideally, consider “full risk portfolio”
  - Target Risk (TR), Countervailing Risks (CR), Ancillary Benefits (AB).
  - Toward “general equilibrium” analysis of benefits side.

• But: risks of delay, “paralysis by analysis.”
  - Still, full portfolio analysis can (i) improve decision outcomes (reduce overall risk); (ii) avoid problems & backlash later (reduce overall delay); and (iii) yield more comprehensive regulation (e.g. multipollutant, multirisk).

• Some ancillary impacts are more important than others
  - Some CRs are overstated, or false positives (as are some TRs).
  - CRs deserve more attention: (i) as TRs are reduced, i.e. as society grows safer; and (ii) where CR victims are neglected (omitted voice)
  - CR can affect decision even if CR < TR
  - Analyze CR up to point when MB of expected improvement in decision = MC of deliberation; or, max(VOI-COI)
Why do Risk-Risk Tradeoffs Occur?

- FBI
  - Accident risk disclosure
- O₃/UV
- MTBE
- Scrubbers
- Outdoor-Indoor
- Asbestos
- Airbags
- Air
- Water
- Waste
- PPTS
- EPA
  - United States Environmental Protection Agency
- OSHA
  - Occupational Safety & Health Administration
  - U.S. Department of Labor
- NHTSA
  - People Saving People
Why do Risk-Risk Tradeoffs Occur? Causes

• Like private firms, regulatory agencies have incentives to externalize harms outside their domains/constituencies
  • Hence neglect of countervailing risk increases may be more worrisome than neglect of co-benefit risk decreases
  • But some R-R tradeoffs are within one domain
  • Regulators’ incentives are not the same as private firms’ incentives

• Cross-Domain:
  • Fragmentation; bounded specialization

• Within-Domain:
  • Deliberation cost
  • Especially after a crisis: hasty policy design
  • Omitted voice; democratic dysfunction
  • Cognitive heuristics – e.g. ‘availability,’ ‘mass numbing’

• Solutions? Analytic. Institutional.
Progress on Risk-Risk Tradeoffs

• Medical care
  • Studies of patient outcomes. Checklists to avoid surgical errors. Computerized prescriptions with clear spelling, patient information, and drug-drug interactions.

• Automobile highway safety
  • Airbags; smart airbags; kids in back; surround sensors; self-braking/driving…

• Climate
  • Multi-gas scope in FCCC and Kyoto Protocol.
  • FCCC art. 4(1)(f) calls for RTA: “employ appropriate methods, for example impact assessments … with a view to minimizing adverse effects on the economy, on public health and on the quality of the environment, of projects or measures undertaken … to mitigate or adapt to climate change”
  • Research on multiple effects of Geoengineering
  • US Clean Air Act sec. 108: RTA of pollutants (Amer. Trucking, DC Cir. 1999)
  • US Clean Air Act sec. 612: RTA of CFC-substitutes
  • IPCC AR5 WGIII: attention to ancillary risks and co-benefits

• Terrorism
  • Integration of diverse agencies into Dept. Homeland Security and Dir. Nat’l Intel.
Solutions for governing risk-risk tradeoffs?
Analysis and Institutions

• Impact Assessment (IA) – growing application. How broad?
  • Environmental Impact Assessment (EIA) – widely applied

• Inter-agency collaboration on cross-domain risks
  • EPA-OSHA on air toxics. EPA-FBI on disclosure of chemical accident risks.
  • Merging agencies? E.g. after 9/11: DHS, DNI. Helpful?

• Needed / challenges:
  • Integrated analysis – optimal ripples? And, assembling diverse expertise.
  • Integrated structure – but too large, clumsy? Specialization vs. integration.
  • Recursive loop from RA (of TRs), to RM, back to RA (of ARs), to full RM.
  • National and international “outcomes studies” to test full portfolio impacts.
  • International learning, diffusion, cooperation (Wiener 2013).

• Toward a holistic culture of complex risk systems
Risk-Risk and Precaution

- Normative – are they at odds?
  - Does risk-risk analysis undesirably delay precaution?
  - Does precaution induce undesirable risk-risk tradeoffs?

- Descriptive / Comparative
  - Do countries differ in their degree of precaution?
  - E.g., USA vs. EU
  - How and Why?
Precautionary Principle and Risk-Risk: normative
(Wiener 2002, 2011)

• Some versions of the PP require action to prevent (uncertain) risk, or require the proponent of an activity to prove safety before the activity may go forward.
  • But: precaution can itself yield new risks (R-R).
  • So: the PP can block itself.
• Solution: Confront multi-risk world. Incorporate multi-risk approach into “optimal precaution.”
  • In reality, precaution is often moderated by R-R.
• Emergence of risks with uncertainty, irreversibility, catastrophe: can arise on all sides.
  • Uncertainty analysis must be multi-risk
  • If precaution is warranted, then ancillary risks also warrant precaution.
  • Type and degree of uncertainty may vary across risks.
Comparative:

Are some societies more precautionary, or more concerned about risk-risk tradeoffs, than others?

USA vs. EU?

A ten-year, multi-risk, multi-author research project.

*(RFF Press / Earthscan / Routledge, 2011)*

I. Introduction
The Rhetoric of Precaution – Wiener

II. Case Studies of Specific Risks
Genetically Modified Foods – Lex & Cantley
Beef Hormones and BSE – Gray et al.
Smoking Tobacco – Blanke
Nuclear Power – Ahearne & Birkhofer
Automobile Emissions – Walsh
Climate and Strat. Ozone – Hammitt
Biodiversity – Saterson
Marine Environment – Freestone
Chemicals – Renn & Elliott
Medical Errors, new drug approval and patient safety – Miller
Terrorism and WMD – Stern & Wiener

III. Information Systems
Information Disclosure – Sand
Risk Analysis Methods – Rogers & Charnley


V. Explanations?
Political Systems – Majone
Legal Systems – Bergkamp & Smith
Perceptions and Culture – Weber & Ancker
Perceptions and Selection – Sunstein

VI. Conclusions
The Real Pattern of Precaution – Wiener
Comparative Precaution: Parity and Particularity

1970s – 80s:
- Marine environment
- Guns

1990s - present:
- Hormones in Beef, rBST
- GM foods / crops
- Climate
- Toxic Chemicals

1970s – 80s:
- New drug approval
- Strat. Ozone (CFCs)
- Nuclear power
- Endangered species
- Lead (Pb) in gas/petrol

1990s - present:
- BSE/vCJD in Beef, Blood
- Smoking tobacco
- Particulate Matter (PM) air pollution (esp. diesel)
- Terrorism
Implications of *The Reality of Precaution*

- **Reality**: complex pattern of Parity and Particularity.
  - Neither EU nor US is generally more precautionary than the other.
  - Comparing broad legal “systems/families” overlooks complex variation
  - Must study wide array of cases (not just rhetoric, or recent visible examples)
  - Large-N study: less than 6% trend toward EU precaution post-1990
  - Selective application: Precautionary particularity, not principle
    - Risk-Risk = selectivity is inevitable in a multi-risk world
- **Multiple explanations for the observed complex pattern**
  - Including: differing public perceptions of TR, crisis events, trade protectionism
  - And: differing views of R-R (e.g., diesel, BSE in blood, terrorism, nuclear)
- **Actual precautionary regulation is often moderated.**
  - False negatives, but also False positives, Costs, Risk-Risk tradeoffs
  - Toward optimal (not maximal) precaution
- **“Better Regulation” in both the US and EU**
  - Regulatory Impact Assessment (IA) and Executive oversight
  - Both Precaution and IA are forms of foresight
- **Diffusion, borrowing:** increasingly interwoven “hybridization” of regulatory systems (more than convergence, divergence, reversal).
  - Opportunity for learning through comparison and exchange.
Thank you.

www.law.duke.edu/fac/wiener