

Natural Hazard Risk Reduction

Michael K. Lindell

Texas A&M University

Hazard Reduction & Recovery Center

Major Issues

- Hazards
- Alternative hazard adjustments
- Stakeholders
- Some market defects
- Available market interventions
- Effects of market interventions
- Ineffective market interventions
- Future research

Hazards

- People are motivated to act when **personal consequences** are high in:
 - Certainty
 - Severity
 - Immediacy
 - Duration

Alternative hazard adjustments

- Mitigation (passive protection at impact)
 - Hazard source control
 - Community protection works
 - Land use practices
 - Building construction practices
 - Building contents protection
- Emergency response preparedness (active response at impact)
 - Staffing, training, facilities and equipment to support plans and procedures
 - Readiness to implement emergency assessment, hazard operations, population protection, and incident management actions

Alternative hazard adjustments

- Disaster recovery preparedness (anticipation of needs for recovery plans and resources)
 - Disaster recovery planning
 - Hazard insurance purchase
- Emergency response (planned and improvised actions to reduce casualties)
 - Evacuation
 - Search and rescue
- Post-disaster relief (redistribute losses by partially compensating victims for the losses they have incurred)

Stakeholders

- Households: variation among demographic segments
- Businesses: variation among sizes and economic sectors
- Government: variation among and within local, state and federal levels
- Non-governmental organizations: variation in missions and capabilities

Some market defects

- People vary but generally have **limited information** about
 - Hazards
 - Hazard adjustments
- People vary but generally have **limited motivation** to adopt hazard adjustments
 - Certain immediate costs vs.
 - Uncertain, potentially long-term impacts
- People vary but generally have **limited resources** for adopting hazard adjustments

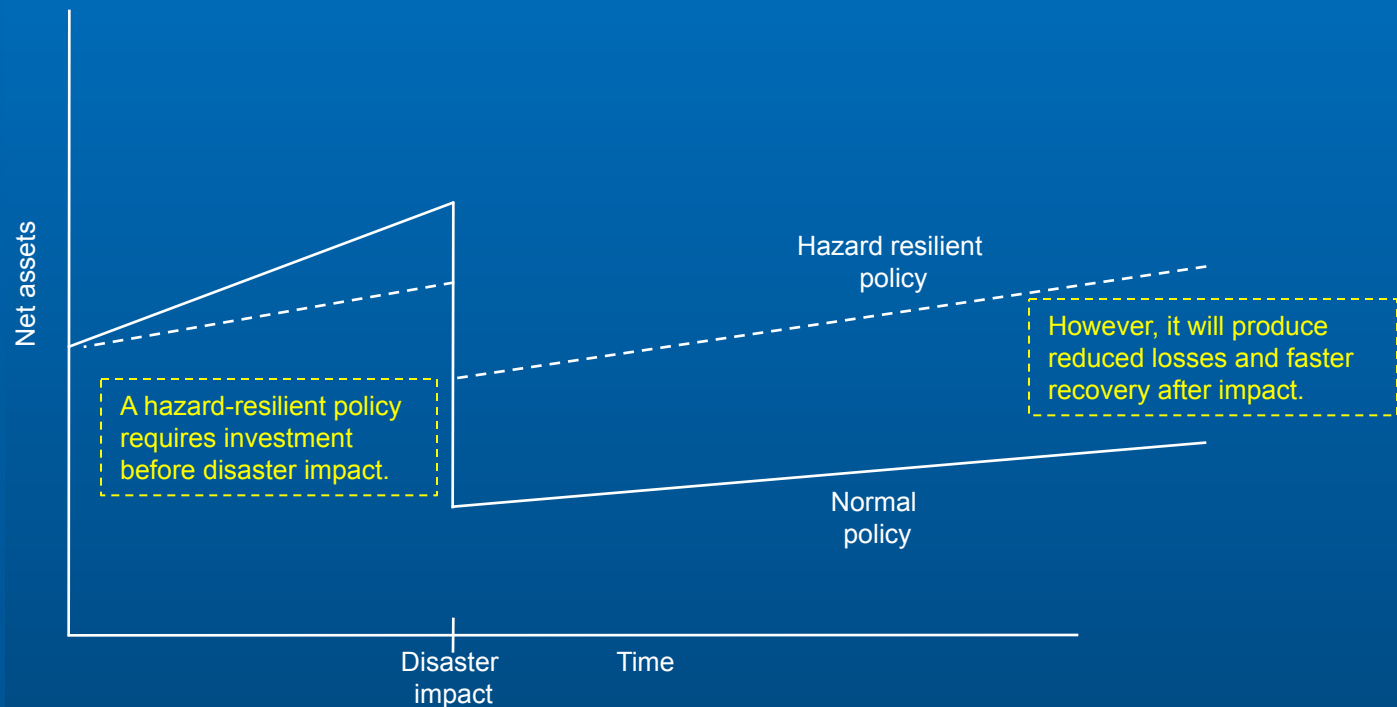
Some market defects

- There are asymmetries among stakeholders
 - Local government benefits from development in hazard-prone areas but the federal government (i.e., the rest of the nation) bears much of the ultimate cost.
 - Land developers have only short-term exposure to hazards before selling to homeowners who bear the long-term risks.

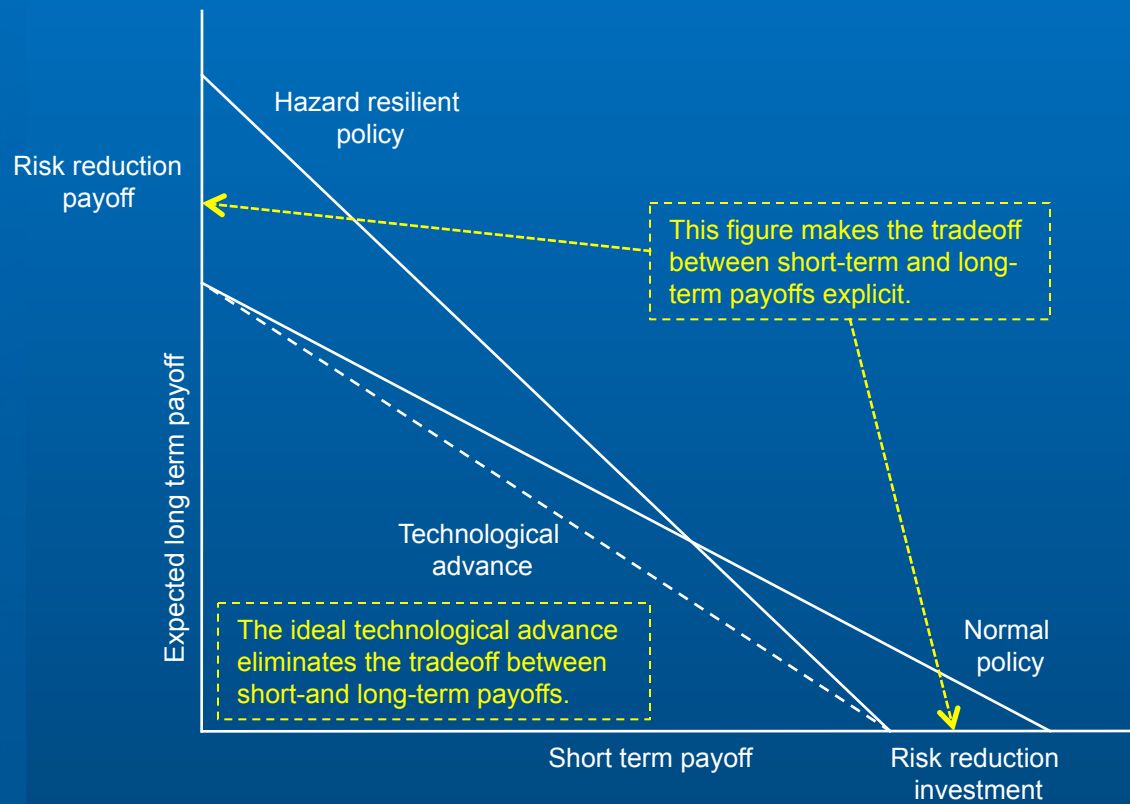
Available market interventions

- Risk communication (intrinsic consequences)
- Sanctions (extrinsic negative consequences)
- Incentives (extrinsic positive consequences)
- Technological advances (greater disaster resilience at reduced cost)

Effects of market interventions



Effects of market interventions (continued)



Ineffective market interventions

- Post-disaster relief redistributes losses from those who take the greatest risks to those who pay the most taxes.
- Subsidized flood insurance has a similar effect but also provides policyholders with greater assurance of a payoff—which probably aggravates the problem.

Future research

- Develop better forms of risk communication that overcome people's limited
 - Message exposure,
 - Message attention, and
 - Message comprehension
- Develop better forms of sanctions that provide reliable inspection to ensure compliance.
- Develop better forms of incentives that provide increased short-term rewards for adopting hazard adjustments.
- Develop technological advances that provide increased effectiveness at reduced cost.