Encouraging Mitigation against Disasters through Private and Public Sector Initiatives

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Two Examples Highlighting Challenges in Encouraging Investments in Mitigation

**Example 1: It Will Not Happen to Me**
The Anderson family is not willing to incur the cost of flood-proofing their home because they are not really worried about the likelihood of flooding.

**Example 2: Budget Constraints**
The Benson family feels they are not in a financial position to incur the $1,500 upfront cost of flood-proofing their home.
Tendency to ignore the chance of future flood damage

Short time horizons and budget constraints do not justify the high upfront cost
Framework for Analysis for Dealing with Extreme Events
(Converting System 1 to System 2 Behavior)

System 1 operates automatically and quickly with little or no effort
- Individuals use simple associations including emotional reactions
- Highlight importance of recent past experience
- Basis for systematic judgmental biases and simplified decision rules

System 2 allocates attention to effortful and intentional mental activities
- Individuals undertake trade-offs implicit in benefit-cost analysis
- Recognizes relevant interconnectedness and need for coordination
- Focuses on long-term strategies for coping with extreme events
Biases and Heuristics Triggered by System 1 Behavior

**Availability Bias** – Estimating the likelihood of a disaster by its salience

**Threshold Models** – Failure to take protective measures if the perceived likelihood of disaster is below threshold level of concern

**Imperfect Information** – Misperceives the likelihood of event occurring and its consequences

**Myopic Behavior** – Focusing on short-time horizons when comparing upfront costs of protection with expected benefits from loss reduction
Aiding Consumers to Undertake Good System 2 Thinking

Provide better information on long-term benefits of mitigation

Stretch time horizon so people will pay attention
  Example: Likelihood of 100-year flood
    • Next year: 1 in 100
    • 25 years: greater than 1 in 5 chance of experiencing at least 1 flood

Use insurance coupled with multi-year loans to make mitigation financially attractive
Principle 1: Premiums reflecting risk
Insurance premiums should be based on risk in order to provide signals to individuals as to the hazards they face and to encourage them to engage in cost-effective mitigation measures to reduce their vulnerability to catastrophes. Risk-based premiums should also reflect the cost of capital that insurers need to integrate into their pricing to assure adequate return to their investors.

Principle 2: Dealing with equity and affordability issues
Any special treatment given to homeowners currently residing in hazard-prone areas (e.g., low-income uninsured or inadequately insured homeowners) should come from general public funding and not through cross-subsidized insurance premiums.

Principle 3: Multi-year insurance
To overcome myopia and encourage investment in preventive or protective measures, insurers should design multi-year contracts with premiums reflecting risk. Insurance vouchers should deal with issues of equity and affordability.
Food Stamp Program

*Mission:* Vouchers to purchase food based on annual income and family size

Low Income Home Energy Assistance Program

*Mission:* Assist low-income households in meeting immediate energy needs

Universal Service Fund

*Mission:* Provide discounts to low-income individuals in rural areas so rates for telecommunications services are comparable to urban areas
Congress renewed NFIP for 5 years in July 2012

- Authorized studies by the Federal Emergency Management Agency and the National Academy of Sciences to examine ways to incorporate risk-based premiums (*Principle 1*) coupled with means-tested insurance vouchers (*Principle 2*)

- There is an opportunity to utilize the NFIP to encourage residents to invest in mitigation measures
Multi-year flood insurance contracts through the National Flood Insurance Program (NFIP) (5-, 10-, 20-years insurance coverage)

Long-term home improvement loans for mitigating one’s property

Insurance and loans are tied to the property, not to the individual
Rates would reflect risk  (*Principle 1*)
(FEMA needs to design better maps)

Insurance vouchers for those needing special treatment
(*Principle 2*)
(Only for those currently residing in flood-prone areas)

Homeowners would have knowledge that their premiums are stable over time  (*Principle 3*)
Encouraging Investing in Mitigation Measures: An Example

Characteristic of Mitigation Measures: Upfront cost/long-term benefits

Cost of Mitigation: $1,500 to flood proof one’s home

Nature of Disaster:

- 1/100 chance of flood
- Reduction in loss ($27,500)

Expected Annual Benefits: $275 (1/100 * $27,500)

Annual Discount Rate of 10%
Expected Benefit-Cost Analysis of Mitigation
(Annual Discount Rate 10%)
Rationale for Multi-Year Flood Insurance
Encouraging Mitigation with Multi-Year Loans

Illustrative Example

Cost of flood proofing: $1,500

Expected annual benefit of partial roof mitigation: $275 \ (1/100 * $27,500)

Annual payments from 20 year $1,500 loan at 10% annual interest rate: $145

Reduction in annual insurance payment: $275

Reduction in annual payments due to mitigation: $275-$145 = $130
Everyone is a Winner:

**Homeowner:**
- Lower total annual payments

**Insurer:**
- Reduction in catastrophe losses and lower reinsurance costs

**Financial institution:**
- More secure investment due to lower losses from disaster

**General taxpayer:**
- Less disaster assistance
Other Complementary Measures to Encourage Mitigation

Reframing the problem of risk---increasing time horizon so one thinks about the likelihood of a flood in 25 years not just next year

Well-enforced building codes

Providing mitigation seals of approval

Providing local, state and federal tax incentives

Encouraging or mandating better zoning and land-use regulations
Conclusions

We need to encourage System 2 rather than System 1 thinking to encourage investments in mitigation.

Multi-year insurance contracts coupled with long-term loans can help in this regard.

The NFIP provides an opportunity for encouraging investment in mitigation measures to make communities more resilient against natural disasters:

- Insurance tied to the property
- Well enforced building codes
- Land-use regulations
Insurance and Behavioral Economics: Improving Decisions in the Most Misunderstood Industry

Part I: Contrasting Ideal and Real Worlds of Insurance
Chapter One: Purposes of this Book
Chapter Two: An Introduction to Insurance in Practice and Theory
Chapter Three: Anomalies and Rumors of Anomalies
Chapter Four: Behavior Consistent with Benchmark Models

Part II: Understanding Consumer and Insurer Behavior
Chapter Five: Real World Complications
Chapter Six: Why People Do or Do Not Demand Insurance
Chapter Seven: Demand Anomalies
Chapter Eight: Descriptive Models of Insurance Supply
Chapter Nine: Anomalies on the Supply Side

Part III: The Future of Insurance
Chapter Ten: Design Principles for Insurance
Chapter Eleven: Strategies for Dealing with Insurance-Related Anomalies
Chapter Twelve: Innovations in Insurance Markets through Multi-Year Contracts
Chapter Thirteen: Publicly-Provided Social Insurance
Chapter Fourteen: A Framework for Prescriptive Recommendations
Disaster Resilience: A National Imperative
The National Research Council – National Academies of Science

http://www.nap.edu/catalog.php?record_id=13457
The Challenges of Linking Flood Insurance with Mitigation Measures

"Jerry looked into flood insurance but says it's too darned expensive."