Mitigation and Resilience Save

Adam Rose

Center for Risk and Economic Analysis of Terrorism Events
and Price School of Public Policy
University of Southern California
Mitigation Saves Study Highlights

• Mandated by Senate Appropriations Committee
• Analyzed 5,500 FEMA Mitigation Grants 1993-2003
  - structural (retrofits, dams, levees, burying power lines)
  - non-structural/process (warnings, mapping, Project Impact)
• More than 90% of FEMA grants went to public sector
  (e.g., structural reinforcement of city halls, pendulum lighting)
• Research team involved more than 50 experts
  - use of HAZUS-MH and various modifications
  - conservative assumptions
  - sensitivity tests
Mitigation Saves Highlights (cont.)

• Benefit-Cost ratio 4:1

• Largest B-C ratios
  - flood-plain buyouts
  - burying power lines

• $14 billion in discounted present value savings
  - 223 lives saved
  - 4,700 injuries prevented

• Equivalent to 14% rate of return on 50-year annuity

• Every dollar spent on mitigation grants leads to avg $3.65 in avoided relief costs & hence taxes
• 4:1 finding cited repeatedly during the 2012 Hearing

• J. Rothman (CEO of IBHS): “Mitigation is a sound fiscal strategy for property owners & all levels of gov’t, almost always resulting in significant L-R savings, including reduced public sector R&R costs.”

• Congressman J. Denham (CA): “I know first-hand the difference building codes can make in saving lives & reducing costs. . . It makes sense for FEMA to encourage such mitigation measures. . .”
Subcommittee Hearing (cont.)

- Congressman Diaz-Balart (FL): *Safe Building Code Incentive Act* (does not mandate or penalize)

- Rod Matthews (VP State Farm): Stressed the dollar cost to the overall economy from recent disasters

- Other recent supporting studies of Building Codes
  - LSU: could have reduced Katrina wind damage by 80%
  - IBHS: did reduce damage from Charley by 60%
  - IBHS: could have reduced Andrew insured losses by 50%
Private Sector Mitigation Potential

• Extensive cost saving potential in private sector
  - comprises nearly 90% of non-residential buildings
  - no indication that B-C ratio would be less than 4:1
  - everyone has a stake in the private sector too

• Some documentation of this potential
  - dozen cases in MMC study
  - studies cited above at Congressional hearing
  - company case studies
  - analogies between public and private buildings
Obstacles to Private Implementation

• Great recession stifled all investment

• Government bail-outs are a major disincentive

• “Public Goods” nature of mitigation
  - benefits received by a broad range of society
    (supply-chain & nearly everyone in interdependent economy)
  - private company will only invest in mitigation up to the point
    where it benefits itself – example of “market failure”

• Solution alternatives
  - mandates/regulation
  - incentives/disincentives (e.g., subsidies/penalties)
    (only for the increment between societal & private benefits)
Resilience

- Often refers to *any action* that reduces hazard losses
- But, there’s a perfectly good word for actions taken *prior* to the event – “mitigation”
- Best use of “resilience” – actions taken *after* an event
  - can *build up resilience capacity beforehand* (increase inventories, emergency drills, identify back-up locations)
  - but these tactics are *not implemented until after* the event
- Can only prevent property damage before the event, but can reduce *business interruption* afterwards (mitigation tactics differ from resilience tactics)
Prominence of Business Interruption

- **September 11 World Trade Center Attacks**
  - property damage (PD): $25 Billion
  - business interruption (BI): $100 Billion

- **Hurricane Katrina**
  - PD: $75B
  - BI: $100B and rising

- **ShakeOut San Andreas Fault Earthquake Simulation**
  - PD: $100B
  - BI: $66B
Economic Resilience

• Definitions:
  - *Static*: ability to maintain function when shocked
    (using existing resources as efficiently as possible)
  - *Dynamic*: hastening the speed of recovery
    (investing expeditiously & wisely in repair & reconstruction)

• BI refers to the production of goods & services (GDP);
  begins at the point of disaster & continues to recovery

• More complicated than property damage estimation
  - affected by behavioral motivations
  - affected by public policy decisions
Role of Buildings in BI

- Buildings are a *capital asset* that provides *services*
  - homes & apartment: shelter for households
  - factories & offices: production of goods

- Building damage past a threshold results in the cessation of production, or BI

- Reducing BI from building damage through resilience
  - business relocation
  - cyber activity
  - repair & reconstruction of buildings more quickly
  - production recapture
Resilience Metric: 9/11 Relocation

- 1,100 firms in WTC; 95% survived by relocating
- If all of firms in the WTC area went out of business, direct Business Interruption loss would = $43B
- If all relocation were immediate, then BI = 0
- Delays took place; still most businesses relocated within 2-4 months, so BI loss = $12B
- Metric: avoided loss / max potential loss
  \[ \frac{\$31B}{\$43B} = 72\% \]
Policy Implications

• Resilience tactics have many low-cost features
  - e.g., relocation inexpensive, cost of recapture is overtime pay
  - don’t need to implement until disaster takes place

• Potential enhancements by the Building Community
  - keep key vacant buildings in good shape
  - build flexibility into design to allow for adaptation of uses
  - make buildings more self-sufficient
  - help facilitate insurance & gov’t aid payments
  - mobilize quickly to repair & reconstruct
  - build mitigation into repair & reconstruction

• Strike optimal balance between mitigation & resilience
Buy-In by Allies

- **Insurance Industry**
  - business interruption insurance
  - contingent interruption insurance

- **Community Resilience Programs**
  - FEMA Challenge Program
  - Rockefeller Foundation 100 Communities

- **Business Continuity Industry**
  - new sector to fill the recovery vacuum
  - broad range of businesses
    (ServPro to IT back-ups to more specialized firms)
Conclusions

• Need for evaluation of *private sector* mitigation

• Need to go *beyond mitigation* to evaluate *resilience*

• Special resilience challenges for NIBS members
  - view buildings more in terms of services they provide
  - become more aware of building contagion effects
  - rebuild quickly, but minimize demand surge issues
  - maintain vacant building stock
  - impart more flexibility into buildings
  - make buildings more self-sufficient

• Work with economists & policy-makers to create *incentives* for post-disaster resilience