Balancing Terrorism and Natural Disasters
Introduction

• Two main tasks for protecting homeland security:
  – Terrorism (e.g., September 11)
  – Natural disasters (e.g., Hurricane Katrina)

• Similarities:
  – Could cause huge casualties
  – May require huge capital investment beforehand

• Differences:
  – Attackers are intelligent and adaptive
  – Natural disasters are not
Motivation

• Both September 11 and Hurricane Katrina have had major impacts on U.S. safety and security policy
• Case in point:
  – What do you call a Democrat whose house was seized by eminent domain?
  – A Republican!
Methodology

• Basic assumptions of game theory:
  – Complete information about the rules of the game
  – Both attacker and defender are fully rational
  – Both attacker and defender want to maximize their utility
• Attacker strategy depends on expected damage:
  – Probability of damage, times the value of the target
• Defender faces threats from both terrorism and natural disasters
Attacker’s Best Responses

- Increased defensive investment can cause attacker to either increase or decrease the attack effort:
  - Attacker effort is initially increasing in defensive investment when target is highly valuable
  - Modest levels of defensive investment can cause attacker to “redouble his effort”
Defender’s Best Response

- Defender's investment in protection from terrorism is initially increasing in attacker effort, then decreasing.
- Protection from natural disasters is inversely related to protection from terrorism:
  - Similar to a budget constraint.
Equilibrium

• Defender cannot completely deter attacker in a simultaneous game:
  – Unless the target is of no interest to the attacker

• Defender can always deter attacker in a sequential game:
  – Since the defender can constrain the attacker’s choices

• This will tend to be worthwhile when:
  – Defensive investment is highly cost-effective
  – The defender valuation of the target is high
  – The attacker valuation of the target is low
Multiple Targets

• Protection from terrorism becomes less cost-effective with multiple targets:
  – Increasing desirability of protection from natural disasters

• This is due to the ability of the attacker to redirect his attack effort:
  – The endogenous nature of attacker effort is critical
Implications

• Increased defensive investment can cause the attacker to either increase or decrease attack effort:
  – This will either decrease or increase the effectiveness of protection from terrorism

• When defensive investment causes attackers to redouble their efforts:
  – Protection from natural disasters becomes more desirable

• Balancing terrorism and natural disasters:
  – The endogenous nature of attacker effort is critical
  – Intelligence can help assess likely attacker responses