Economics of Business Interruption Insurance Against Terrorism

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Prominence of Business Interruption

- September 11, World Trade Center Attacks
  - property damage: $24 billion
  - BI: $100 billion
- Hurricane Katrina
  - Property damage: $75B
  - BI: $100B and still rising
- “ShakeOut” San Andreas Fault Earthquake
  - Property damage: $100B
  - BI: $67B

Dirty Bomb Attack in LA

- 9/11: unconventional delivery/conventional destruction
- Rad/Chem/Bio in contrast: insidious attack agents
  - could spawn enormous dread
  - could engender fear of lingering contamination
- Economic impacts
  - property damage minimal
  - major direct and indirect BI

    (15X larger than ordinary BI; 10,000X property damage)

Cyber Attack

- Insidious in other ways
  - stealth
  - extensive reach
- Again, property damage could be minimal
- BI losses can be enormous (halt or scramble):
  - financial markets
  - ordinary business transactions
  - infrastructure provision
- Losses worldwide could be in trillions of dollars

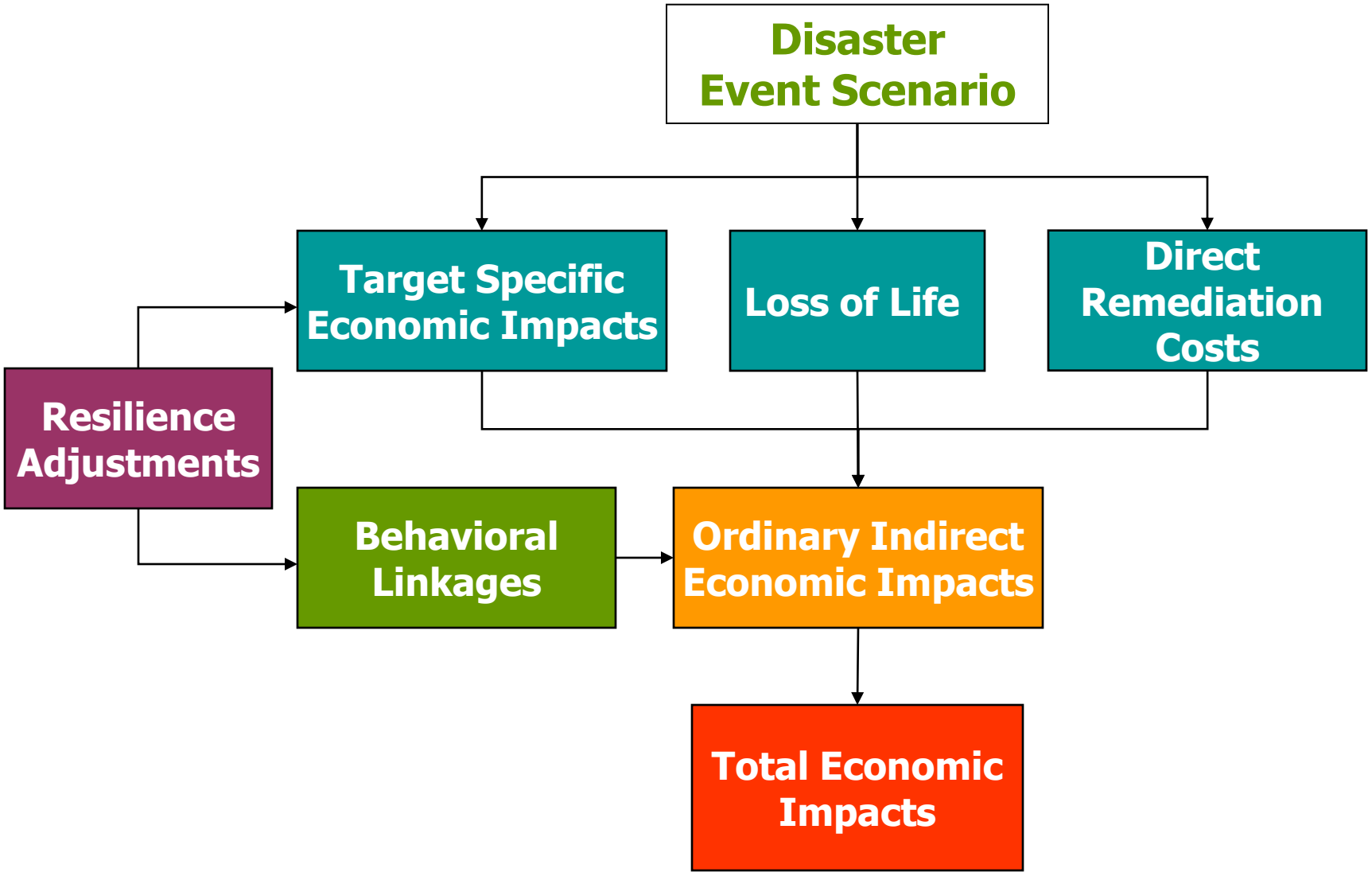
Key Questions on BI Insurance: Are These Losses Insurable?

1. Are they worthy of insurance protection?
2. How do we measure BI and CBI?
   - BI: measure resilience & behavioral linkages
   - CBI: use computable general equilibrium analysis
3. How do we handle the many complications?
4. How can terrorism BI insurance be made financially sound?

BI Insurance Complications

- BI is less physically apparent than property damage
- Stock vs. Flow distinction:
  - Property damage takes place at a given point in time
  - BI just begins at the point of the disaster & continues until recovery is complete (or reaches a “new normal”)
- Thus, BI affected by the variability of:
  - public policy: outside aid, reconstruction
  - resilience: numerous ways to mute losses
  - behavior: fear (risk perceptions)
  - behavior: gaming the system (e.g., moral hazard)

Consequence Analysis Framework



BI Insurance and Resilience

- Elements of ordinary BI insurance coverage
  - direct damage of property
  - slowdown or suspension of operations
  - period of interruption
  - actual loss of income
- *Due diligence requirement to mitigate BI loss; Resilience refers to how this is accomplished*
- Tension/ambiguity between insurers & insureds affect likelihood of implementation of resilience

Economic Resilience

- Definitions:
  - *Static*: ability to maintain function when shocked
  - *Dynamic*: speed of the system to recover
- Operative at micro, meso, macroeconomic levels
- Resilience implementation:
  - capacity can be enhanced before the event, but it is implemented in the aftermath
  - some inherent & some adaptive

Resilience Example: 9/11Relocation

- 1,100 firms in WTC; 95% survived by relocating
- If all of firms in the WTC area went out of business, direct BI loss would = $43B
- If all relocation were immediate, then BI = 0
- Delays took place; still nearly all businesses relocated within 8 months, so BI loss = $12B
- Metric: avoided loss / maximum potential loss

$31B/$43B = 72%

Behavioral Linkages

- Off-site responses stemming from behavioral change (business, household, investor, worker, gov't)
- Sources:
  - social amplification of risk (media coverage, rumor)
  - stigma effect (lingering fear)
- Fear feeds on itself and spreads (people/time/space)
- Translates into direct and indirect BI losses
- Could be 2 to 3 orders of magnitude higher

September 11 and the "Fear Factor"

- CREATE Economic Impact Modeling Forum: Economic Impacts of WTC Attacks
  - property damage: $25 billion
  - loss of life: $15B
  - direct business interruption: $11B
  - indirect business interruption: $14B
  - reduced airline travel/tourism: $50B
  - indirect effects of fear factor: $60B

  Total of business interruption: $135B

RDD Direct Behavioral Effects (Burns and Slovic Survey)

- Consumer/tourist risk perceptions
  - 15 to 23% price discount (subset of goods)
  - mid-range of stigma-related WTP literature
- Employee risk perceptions
  - >25% risk premium in affected area
  - much higher than WTP literature for other types
- Investor risk perceptions (non-survey)
  - 20% rate of return premium
  - mid-range of property value studies (Lucas, 2004) & factoring in Tobin's Q

LA RDD BI Impacts

Impact	BI Category	
1) Short-run	Direct business interruption (BI). (Output loss, $m.)	-$1,400
2) Short-run	Direct business interruption (BI). (GDP loss, $m.)	-$817
3) Short-run	Indirect business interruption (BI). (GDP loss, $m.)	-$214
4) Short-run	Other resource loss. (GDP loss, $m.)	-$27
5) Short-run	Behavioral effects. (GDP loss, $m.)	-$889
6) Short-run	Total short-run. (GDP loss, $m.)	-$1,947
7) Long-run	One-Year Behavioral. (GDP loss, $m.)	-$2,628
8) Long-run	Total Ten-Year Behavioral. (GDP loss, $m.)	-$15,808
9) NPV	NPV (5%) of Total Ten-Year Behavioral (GDP loss, $m.)	-$12,849
10) Ratio = [(2)+(3)]/(2)	S-R total BI/S-R Direct BI	1.26
11) Ratio = [(2)+(3)+(4)]/(2)	S-R Ordinary Loss / S-R Direct BI	1.30
12) Ratio = (7)/(2)	L-R One-Year/S-R Direct BI	3.22
13) Ratio = (8)/(2)	Total Ten-Year Behavioral/S-R Direct BI	19.4
14) Ratio = (8)/[(2)+(3)+(4)]	Total Ten-Year Behavioral/Ordinary Loss	14.9

Contingent BI

- Coverage for BI resulting from property damage to named dependent suppliers or customers:
  - locations that supply critical inputs
  - locations that accept the insured's products
  - manufacturing locations that provide products for delivery to the insured's customer
  - leader locations that attract customers to the insured's business (e.g., anchor store in a mall)
- Typically assumed to be more difficult to measure

Contingent BI Estimation

- Computable General Equilibrium (CGE) Modeling
  - ideal for estimation of “indirect” effects
  - multi-market model of behavioral responses to changes in prices & external shocks w/in limits of available capital, labor & natural resources.
- Model of integrated supply chains at the sector level
  - Inherent resilience imbedded in the model
  - Adaptive resilience through parametric changes

Conclusions

- BI & CBI of terrorism is potentially enormous and thus worthy of insurance
- BI & CBI are amenable to measurement/prediction
- Measurement is complicated by behavioral responses, public policy, and strategic gaming
- Many polices are available to reduce BI & CBI
- Insurer/insured cooperation is needed to reduce strategic gaming