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The Economics of Natural Disasters

NABE Regional/Utility Roundtable Webinar

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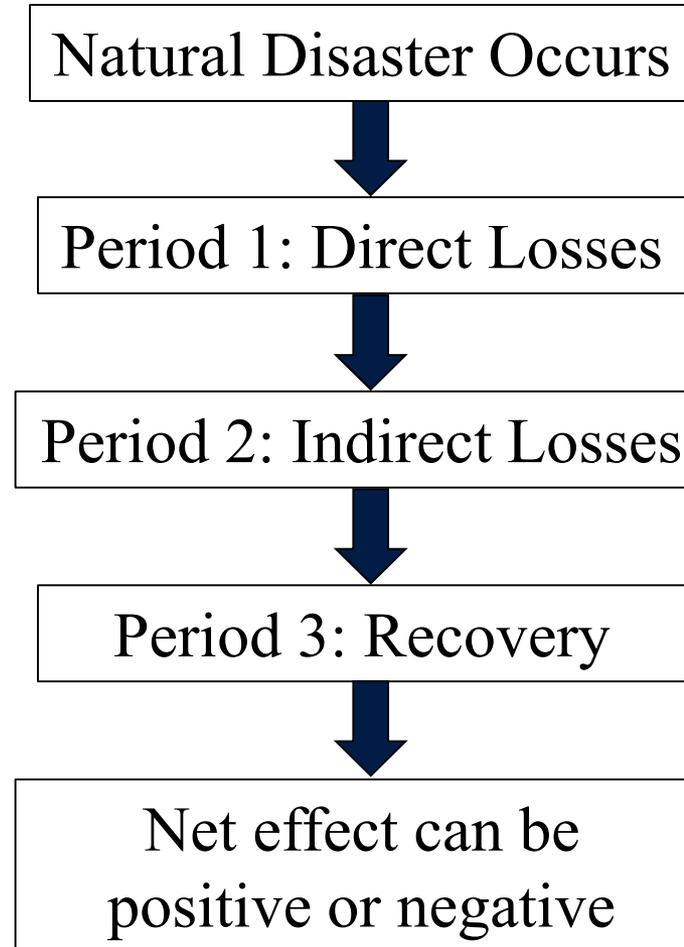
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Disclaimer

The views I will express today are my own and do not necessarily reflect the positions of the Federal Reserve Bank of St. Louis or the Federal Reserve System.

Natural Disaster Response Timeline



Key Issues

- Type of disaster, its duration, and its location.
 - Earthquakes vs. floods vs. droughts vs. snow/ice storms vs. tornadoes, vs. wildfires etc.
 - Example: hurricanes that make landfall in highly populated areas vs. less populous areas.
 - Hurricanes Harvey, Sandy and Katrina vs. Isabel (2003).
- Role of uncertainty in estimating damages/losses.
 - Initial estimates have large confidence intervals!
 - Historical comparisons are useful but imperfect guides due to technological changes (e.g., stricter building codes).
 - And loss estimates double every 10 years (Pielke, et. al).

Hurricanes are the largest disasters.

- Smith and Matthews (2015), using an NOAA data base of billion dollar disaster events (1980-2013), showed that hurricanes generate the largest share of losses, have the highest average loss per event, and are the most frequent large-dollar disaster event.
- Large natural disasters trigger a complex chain of events that impact the local and national economy.
- Principles of damage assessment: losses vs. costs.
 - Losses: destruction of wealth (tangible assets).
 - Costs: Incurred to repair, replace, or reinforce tangible assets.

Measuring Losses

- Direct vs. Indirect losses
 - Direct: Damage to buildings, structures, crops, loss of life.
 - Indirect: Effects stemming direct losses, such as lost output, retail sales, wages, taxable receipts, increased commuting, and business rerouting costs, etc.
- Insured vs. uninsured losses
 - How to value goods: Market prices exist for some goods (autos) but not others (public infrastructure).
 - Research suggest 10-20% of homeowners are uninsured or underinsured; only 40-60% of national disaster-induced business losses are covered by insurance (Smith & Matt.).

Measuring Losses (continued)

- Stage of business cycle can matter.
 - Example: Hurricane Ike in 2008 vs. Harvey in 2017.
 - Then: Deep recession. Today: shortages of labor and materials in the construction industry.
- Quality of data (private and public), methodology, and key assumptions.
 - Example: Some damage estimates (direct losses) differ dramatically for Hurricane Katrina.
 - ICAT: \$ 91.1 billion
 - NOAA: \$160 billion

Recovery and Rebuilding

- Rebuilding or replacing capital stock that is damaged or destroyed boosts the pace of growth of economic activity over a fixed time period.
 - Increases in sales to replace damaged or destroyed goods.
 - Increased demand for labor and products (e.g., cement).
 - Local economy may or may not benefit due to leakage.
 - New capital often more technologically advanced.
- Response of federal, state, and local governments.
 - Can affect timing and magnitude of funds disbursed for relief and rebuilding efforts.

Definitions and Concepts

Calculating the Economic Effects of Natural Disasters: Some Definitions and Concepts

Term	Definition	Example
Losses	Change in wealth caused by damage to structures or other physical assets	Houses, buildings and structures are damaged, crops and forests destroyed, landslide damages
Direct vs. Indirect Losses	Direct losses are those resulting from building, lifeline, and infrastructure damages. Indirect losses are those that follow from the physical damages	Direct losses: building damages, bridge collapse, loss of lives. Indirect losses: commuter disruptions, loss of local tax revenues, reduced tourism
Market vs. Non-market Effects	Market effects are those that are reflected in national income accounts data; Non-market effects do not appear in the national income accounts data	Market effect: loss of income due to disaster-caused destruction. Nonmarket effects: loss of leisure time due to longer commute as a result of the disaster
Costs	Highest-valued of foregone alternative use of a resource	Mitigation expenditures undertaken before the disaster occurs, (for example, construction of levees or seawalls or reinforcement of buildings) and reconstruction of buildings, etc. during recovery period
Redistribution	Transfer of wealth between individuals or governments	Federal disaster relief, but also includes transfers that occur because resources or production are moved to a new region
Wealth	Present value of the income stream from the productive assets of society	The value of a forest or farmland is the sum of the flow of monetary benefits (income from sales of timber or crops) and non-monetary benefits (vistas and recreational benefits of a forest)

SOURCE: Kliesen, "The Economics of Natural Disasters," FRB St. Louis, April 1994.



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