

# Financing supply chain resilient infrastructures via resilience bond

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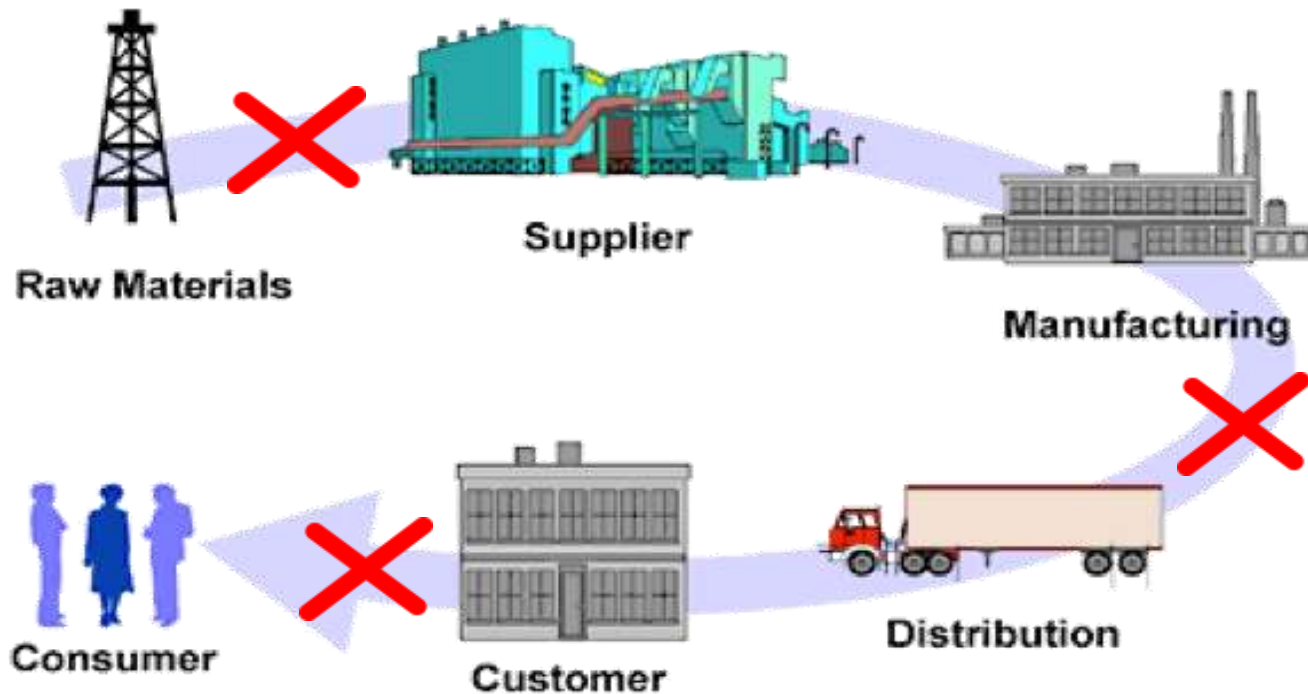
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# Supply chain



Supply chain disruption is one of the top five influence factors to companies' revenue, which brings 14% downside risk to the UK and Germany, 5% for France and 17% for North America.

# High cost of supply chain disruption



**Top ten supply chain disruptions in 2015**

Location	Events	Impacts	Estimated losses
Tianjin	Port explosion	Influenced 285 of 'Fortune Global 500' companies	\$9 billion
Chennai	Floods	Plant operations stopped and supplies were exhausted	\$1 billion
Nhava Sheva	Workers strike	Vast cargo backlogs and congesting road routes	-
Turkish	International relations	Around 1250 export cargo trucks being held and 800 containers awaited clearance at seaports	-
Mombasa	Workers strike	5000 workers disrupted multiple industries with fuel imports and agricultural exports	-
Brazil	Truckers strike	Drivers either refused to work or blockaded roads across the entire country	\$184 million
Chile	Customs stoppages	Congestion, long lines of stationary trucks and abandoned containers	\$100 million
Panama	Canal congestion	Ocean carriers had to cancel services and make costly adjustments, which delays of up to 10 days	-
Mexico	Hurricane	Airports and transportation hubs were closed	-
USA	Extreme winter weather	Power was lost, flights were canceled, and roads, trains, buses, and ferries ground to a halt	-

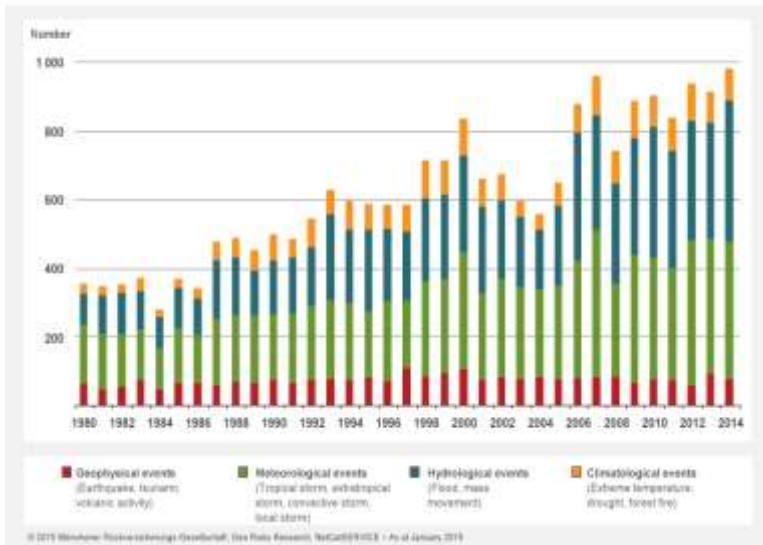
Source from: DHL

# Unpredictable catastrophic events

NatCatSERVICE

Loss events worldwide 1980 – 2014  
Number of events

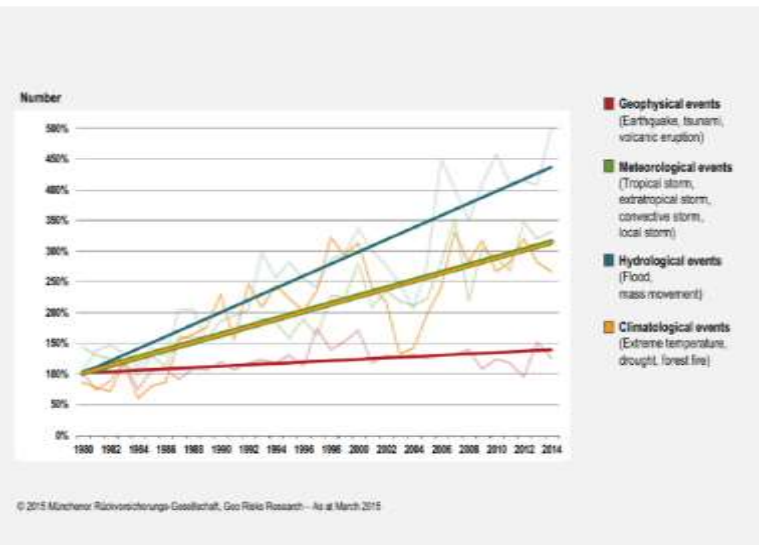
Munich RE 



NatCatSERVICE

Loss events worldwide 1980 – 2014  
Number of events with relative trend

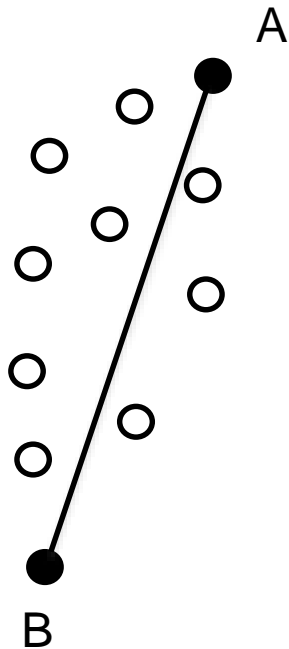
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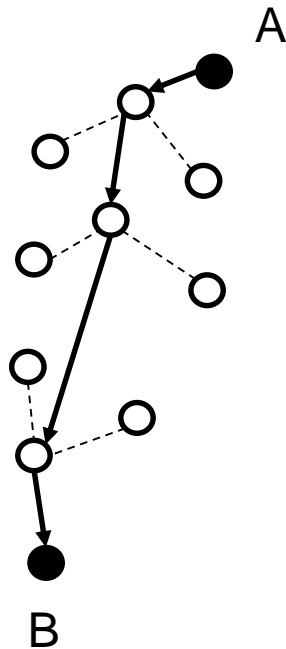
Natural catastrophes have resulted in a severe setback to the development of many countries within last 30 years, which also caused 2 million death and 182 million homeless of people with nearly \$1.4 trillion worth losses.

*Guha-Sapir et al. (2004), Thirty years of natural disasters 1974-2003: The numbers (Presses univ. de Louvain).*

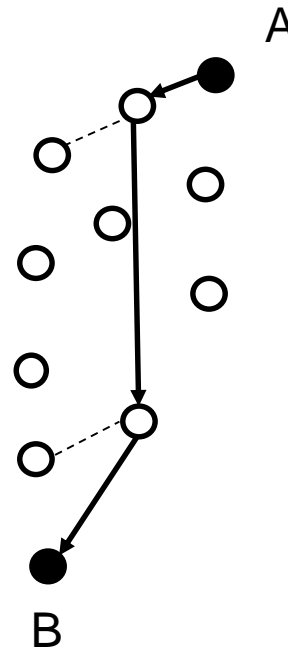
# Intermodal Logistics Hub (ILH) as a solution



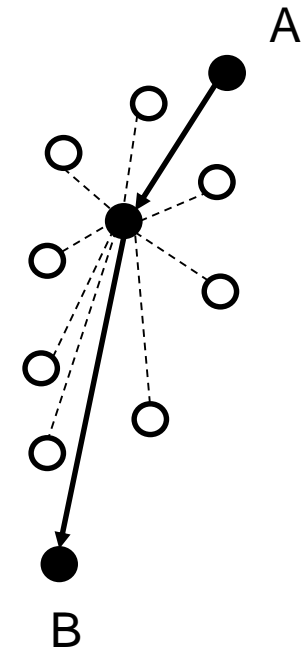
**Direct link**



**Corridor link**



**Connected hubs**



**Intermodal Logistics Hub**

# Intermodal Logistics Park

**IGS**  
**Intermodal**



**Bremerhaven**  
**Germany**

# Supply chain resilient infrastructures

- Resilient infrastructure is designed to
  1. Enhance physical resilience
  2. Mitigate risks and financial losses

Money?

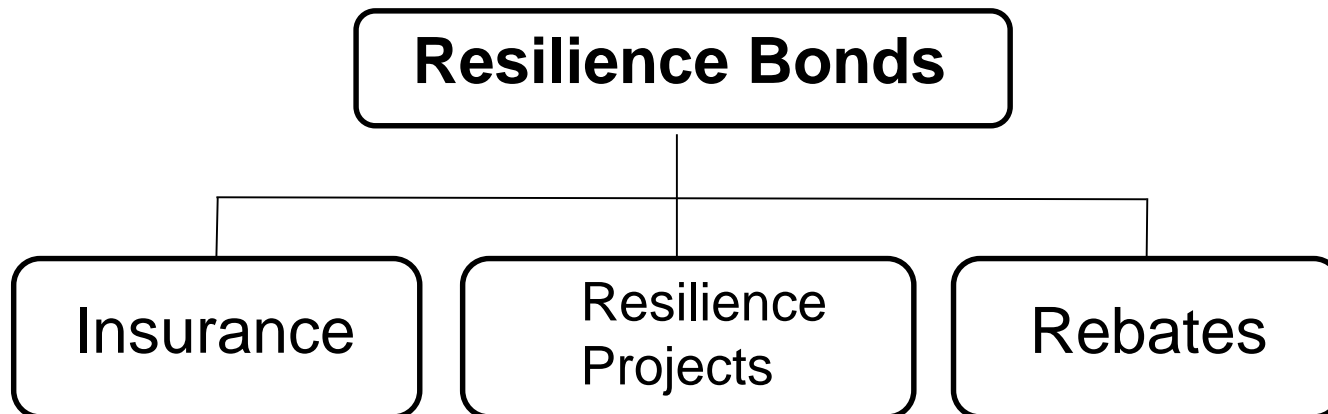


- Challenge for Funding Resilient Infrastructure
  - Limited budget for public and private resources
  - Returns are long-term and low yield

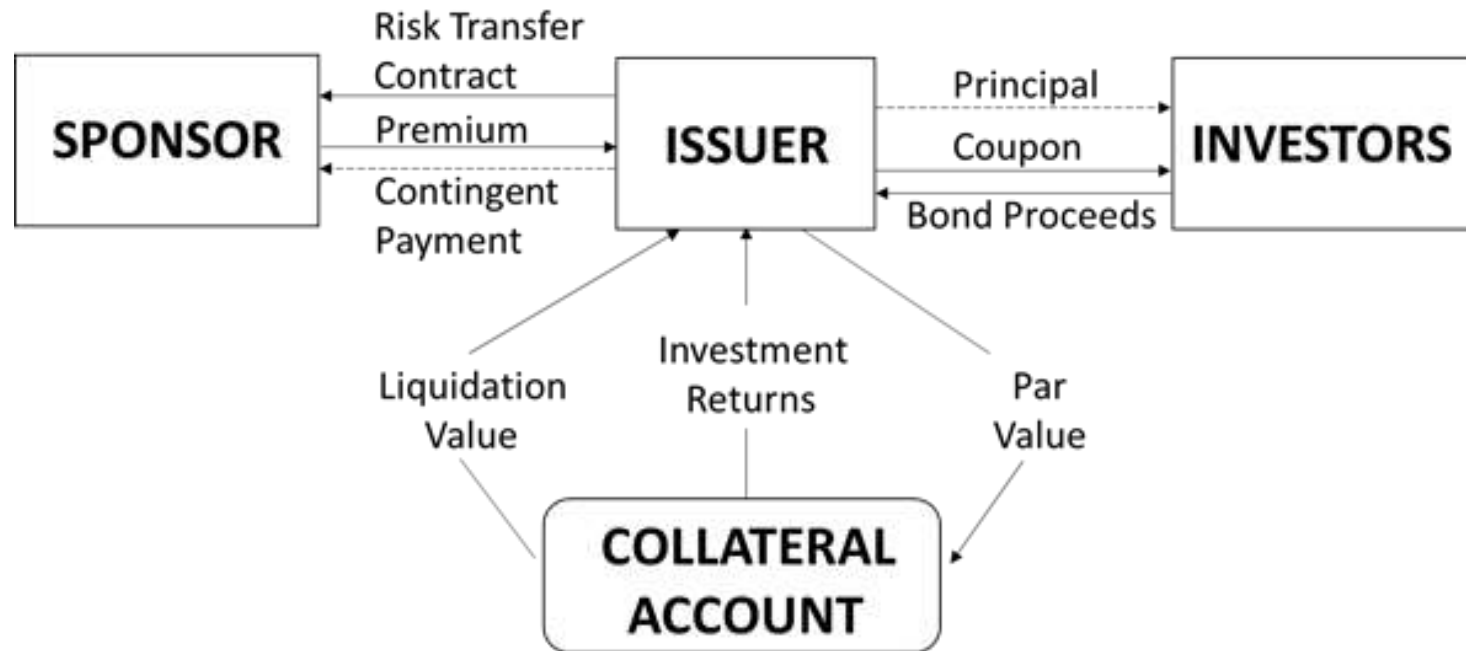


# Leveraging Public & Private Finance for Resilience

- ◆ Resilience bonds are one possible approach to protect financial value and provide investment for physical resilience.
- ◆ Opportunity for Resilience bonds
  - Close the investment funding gap by rebates
  - Connect insurance coverage with the capital investments in resilient infrastructure systems



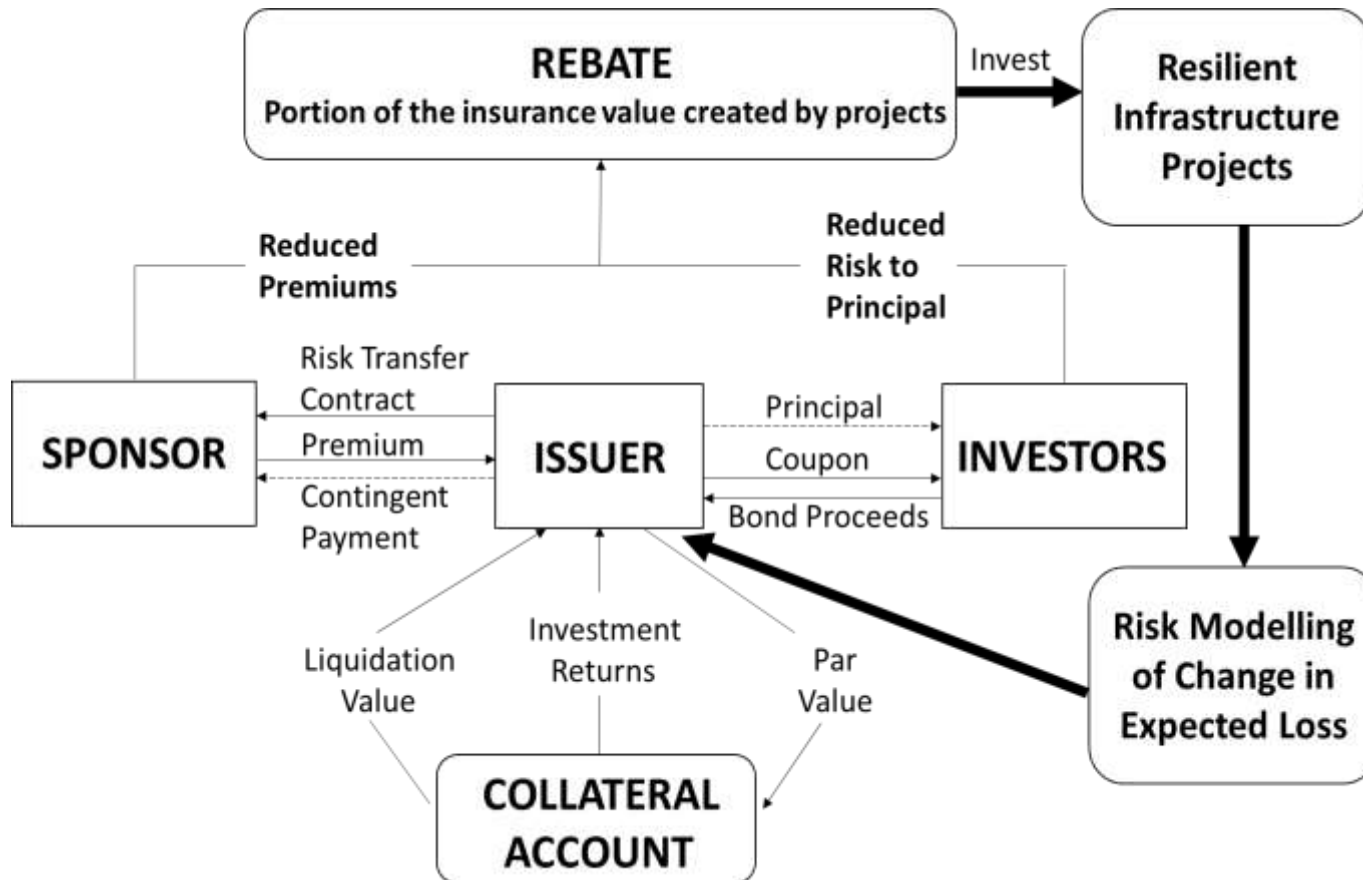
# Catastrophe (CAT) bonds



The creation of CAT bond has allowed insurers reduce default risks, in effect, transfer the risk to the capital market investors.

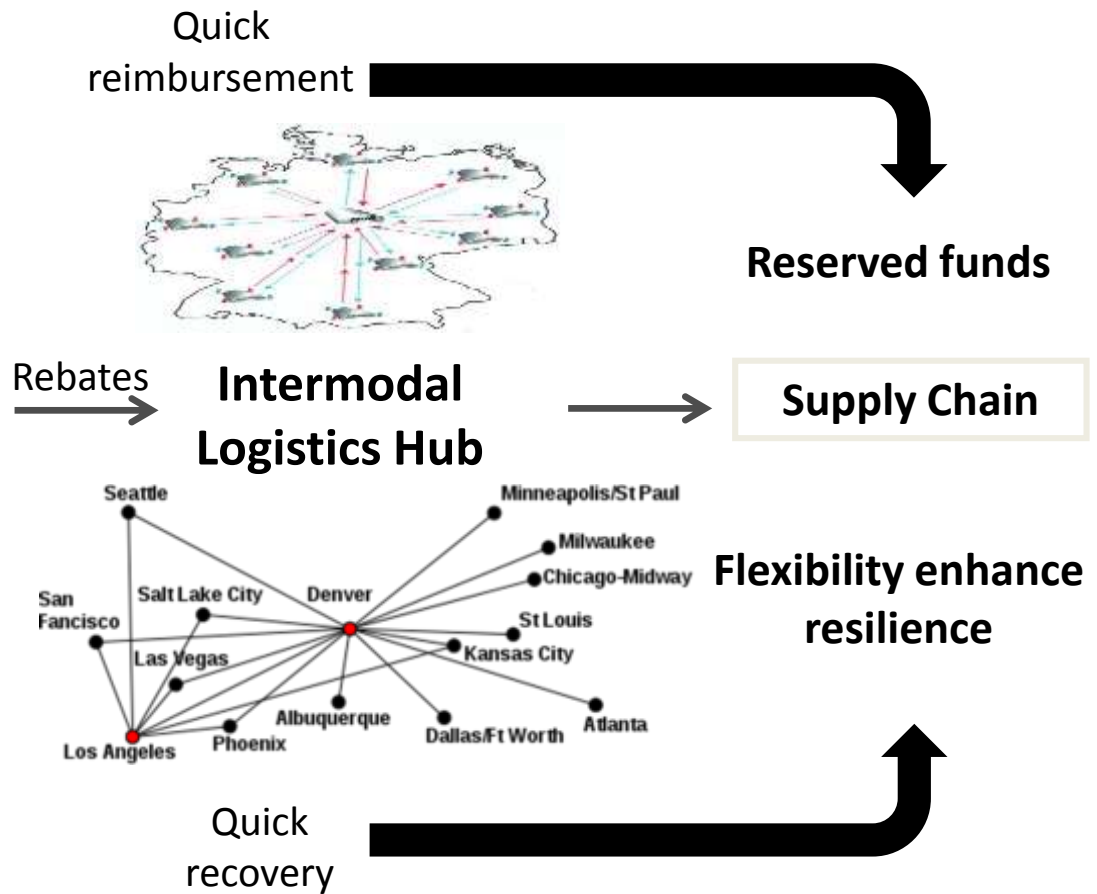
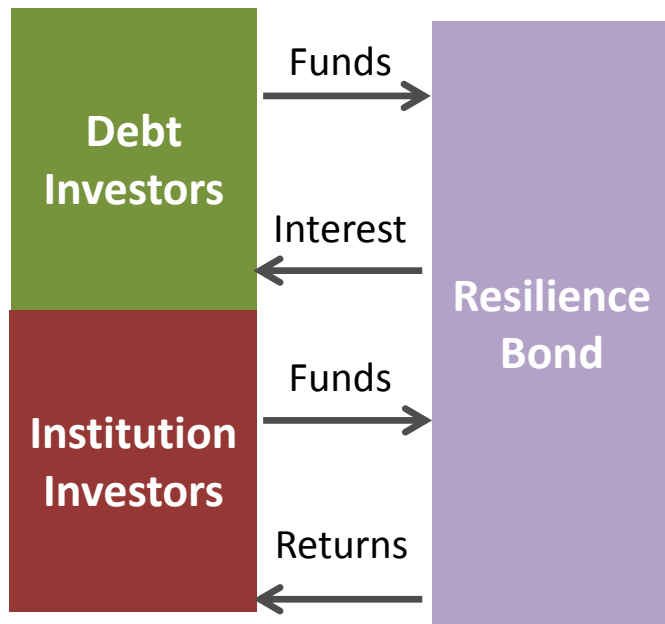
*Vaugirard, Victor E (2003), 'Pricing catastrophe bonds by an arbitrage approach', The Quarterly Review of Economics and Finance, 43 (1), 119-32.*

# How Resilience Bonds Work



Re:Focus (2015), 'LEVERAGING CATASTROPHE BONDS: As a Mechanism for Resilient Infrastructure Project Finance', RE bound insurance report.

# The Supply Chain Resilience Bond Structure



# Benefits of Resilience Bonds

1. Fill funding gaps for supply chain intermodal logistics hub
  - Investments for different project phases
  - Operations and maintenances costs
  - Or add in insurance
2. Advantages for (re)insurance companies
  - Avoid default risks
  - Less loss when disruption occurs
3. Help with resilient projects design and process
  - Avoid moral hazard
  - Standards and benchmarks

# Thank you!

## Q&A

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