

2021 Joint
Property/Casualty and
Health Actuarial Seminar

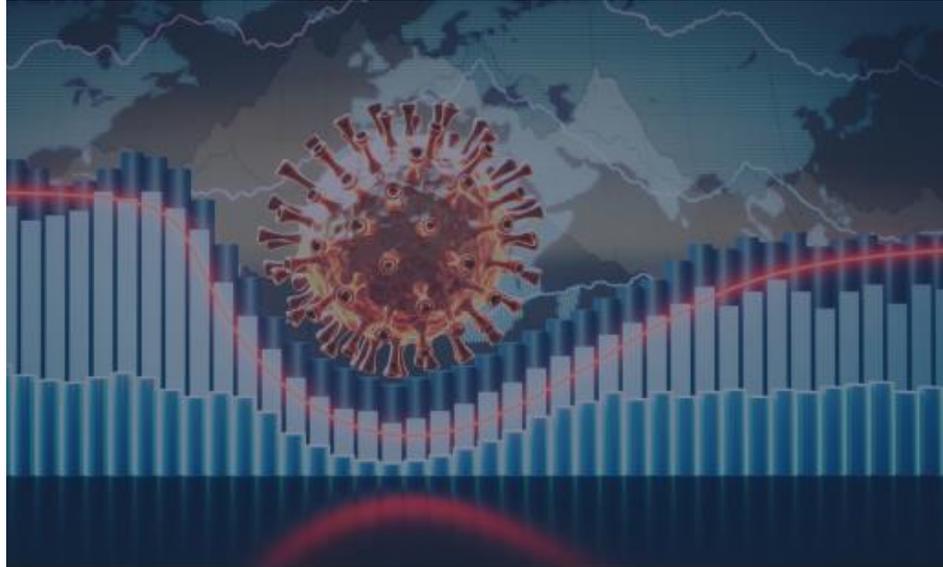
Hosted by the Actuarial
Institute of Chinese Taipei

Aditya Khanna FCAS

Tim Wei FCAS

Brian A. Fannin ACAS CSPA





- **On Insurability and Transfer of Pandemic Business Interruption Risk**

Aditya Khanna, FCAS; Brian A. Fannin, ACAS, CSPA; and Tim Wei, FCAS



**Research
Brief**

We have been
here before

≡ WIRED

SUBSCRIBE

FELIX SALMON

BUSINESS 02.23.2009 12:00 PM

Recipe for Disaster: The Formula That Killed Wall Street

In the mid-'80s, Wall Street turned to the quants—brainy financial engineers—to invent new ways to boost profits. Their methods for minting money worked brilliantly... until one of them devastated the global economy.

Diversity of cause of loss vs. diversity of exposure

Global financial market

Japan

United States

etc.

Real estate

Manufacturing

etc

Real estate

Manufacturing

etc

Real estate

Manufacturing

etc

company

Diversity of exposure reduces risk

Global financial market

Japan

United States

etc.

Real estate

Manufacturing

etc

Real estate

Manufacturing

etc

Real estate

Manufacturing

etc

company

Can we reduce risk when every risk is exposed to the same cause of loss?

COVID Business Interruption

Japan

United States

etc.

Real estate

Manufacturing

etc

Real estate

Manufacturing

etc

Real estate

Manufacturing

etc

company

Covid, Business Interruption and Risk



How Small Businesses Contribute to Local Economies



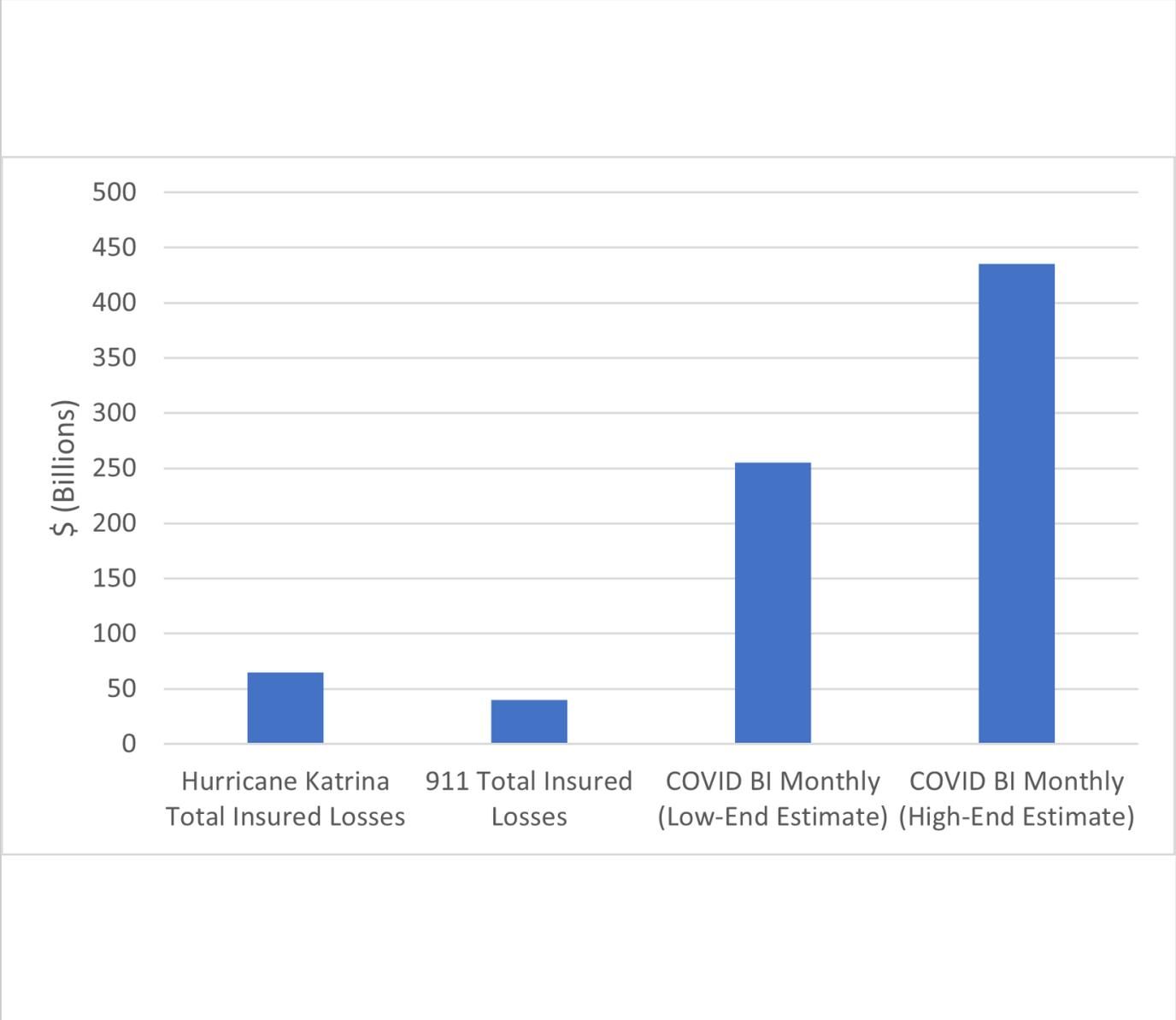
- Product Innovation
- Job Creation
- Brand Diversification

Impact of COVID-Induced Business Interruption losses?

Hurricane Katrina figure from <https://www.iii.org/sites/default/files/1007Katrina5Anniversary.pdf>

911 figure from <http://www.iags.org/costof911.html>

COVID figures based on study published by American Property Casualty Insurance Association at <http://www.pciaa.net/pciwebsite/cms/content/viewpage?sitePageID=60522>.





Should the insurance industry indemnify COVID business interruption? Can it?

- Contracts explicitly exclude coverage
- Insufficient capital to indemnify

What is Risk?



What is Risk

Possibility of an event that:



Takes place in the future



Encompasses uncertainty as to location and timing



Arises out of circumstances beyond the control of the individual whose wealth is impaired



Results in sudden deteriorations in someone's financial position



shutterstock.com · 623721260



Image from PublicDomainPictures.net



Image from Pixabay

What is Risk?



Risk Transfer
and
Insurability

Insurability

Feasibility of creating contracts that transfer risk from the insureds to the insurer.

Risk Transfer

Two parties agreeing to contractually allow one party to bear the risk of the other in exchange for an immediate and adequate financial reward

Insurability Criteria

Criterion	Criterion Type
Fortuitous	Actuarial
Measurable	Actuarial
Independent	Actuarial
Market-Bearable	Actuarial
Predictable	Actuarial
Fair	Economic
Affordable	Economic

Insurability Criteria

Criterion	Criterion Type	Detail
Fortuitous	Actuarial	Timing and location of future events must be uncertain and accidental.

Pandemic BI Risk and the Fortuitous Criterion

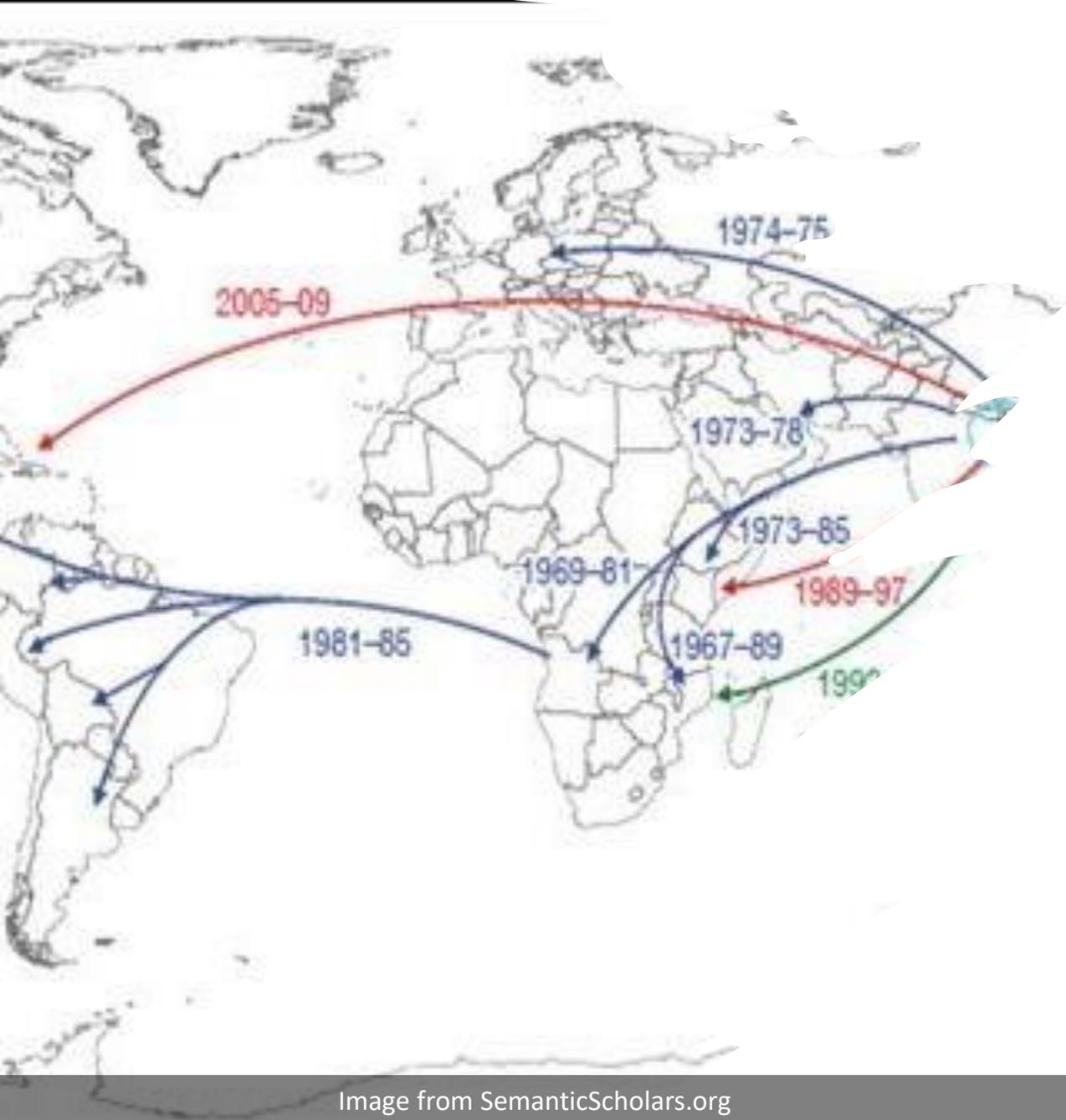
- Long stages of pandemic development makes this criterion difficult to meet.

Current WHO phases of pandemic alert		
Interpandemic phase	Low risk of human cases	1
New virus in animals, no human cases	Higher risk of human cases	2
Pandemic alert: New virus causes human cases	No or very limited human-to-human transmission	3
	Evidence of increased human-to-human transmission	4
	Evidence of significant human-to-human transmission	5
Pandemic	Efficient and sustained human-to-human transmission	6

From the World Health Organization (as of Apr 18, 2007).

Insurability Criteria

Criterion	Criterion Type	Detail
Measurable	Actuarial	Losses must be well-defined and verifiable upon occurrence.



Pandemic BI Risk and the Measurable Criterion

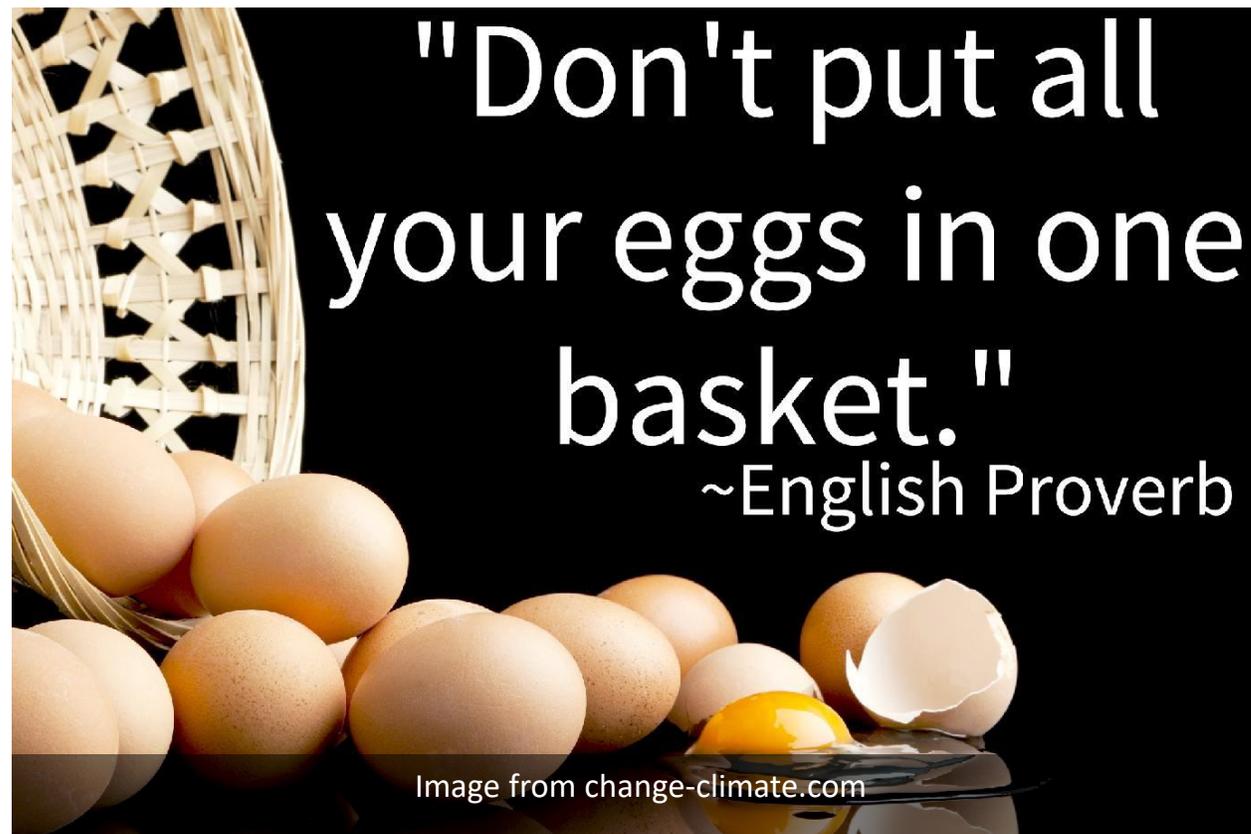
- Difficult to define coverage period.

Insurability Criteria

Criterion	Criterion Type	Detail
Independen t	Actuarial	There must be weak or no correlation within a portfolio of insureds.

Pandemic BI Risk and the Independent Criterion

Global and regional nature of breakouts makes it likely that claims will not be independent.



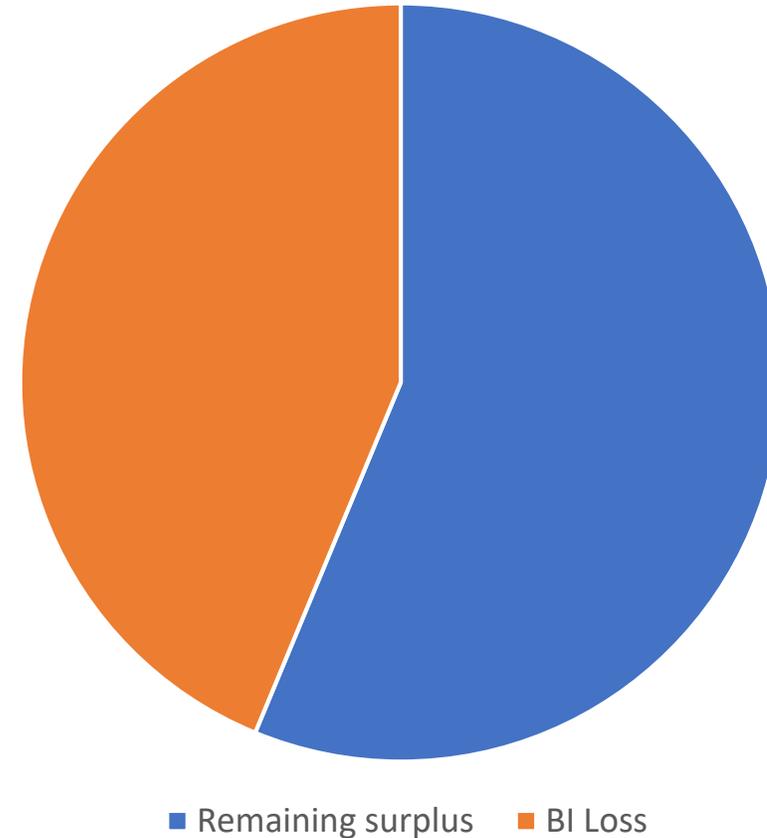
Insurability Criteria

Criterion	Criterion Type	Detail
Market-Bearable	Actuarial	Maximum possible losses in an accident year are not too excessive for insurance markets to absorb.

Pandemic BI Risk and the Market- Bearable Criterion

- Figure proportions based on study published by American Property Casualty Insurance Association at <http://www.pciaa.net/pciwebsite/cms/content/viewpage?sitePageID=60522>.

Monthly losses for businesses with fewer than 100 employees and remaining insurance industry surplus



Insurability Criteria

Criterion	Criterion Type	Detail
Predictable	Actuarial	Costs must be estimable, which requires sufficient number of insureds across sufficiently large number of historical events to be used as sample data.

Past Pandemics

2009 H1N1 Pandemic

1968 Pandemic (H3N2 virus)

1957-1958 Pandemic (H2N2 virus)

History of Flu Pandemic 1930 -
Today

1918 Pandemic

1918 Partner Resources

1918 Ask a Scientist Special

Pandemic BI Risk and the Predictable Criterion

- Limited number of historical pandemics.
- Pandemic losses that happened long ago are no longer applicable.

Graphic from Centers for Disease Control and Prevention (CDC)

website: <https://www.cdc.gov/flu/pandemic-resources/basics/past-pandemics.html>

Insurability Criteria

Criterion	Criterion Type	Detail
Fair	Economic	There should be no potential for adverse selection or moral hazard in the risk portfolio.

Pandemic BI Risk and the Fair Criterion

- Mandatory coverage for everyone to prevent adverse selection.
- Prevent over-reporting of claim amounts.



Image from Pixabay

Insurability Criteria

Criterion	Criterion Type	Detail
Affordable	Economic	Transfer price must be attractive to both the insurers and the insureds.

Pandemic BI Risk and the Affordable Criterion

- Uncertainty in loss cost estimates.
- High probable maximum loss due to correlations.



This Photo by Unknown Author is licensed under [CC BY-SA](#)



Insurability Criteria

Criterion	Criterion Type	Met?
Fortuitous	Actuarial	yes
Measurable	Actuarial	difficult
Independent	Actuarial	no
Market-Bearable	Actuarial	no
Predictable	Actuarial	no
Fair	Economic	yes
Affordable	Economic	no

Risk Transfer Options

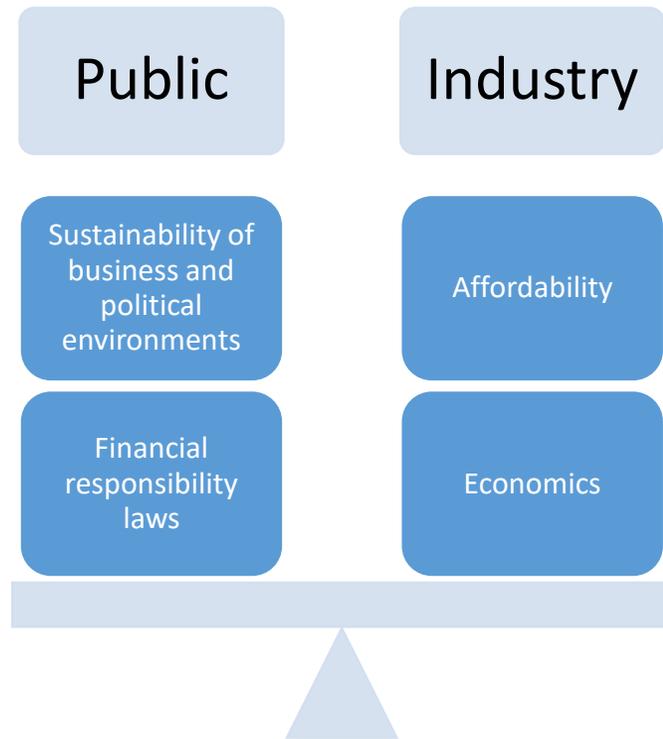


Why bother?

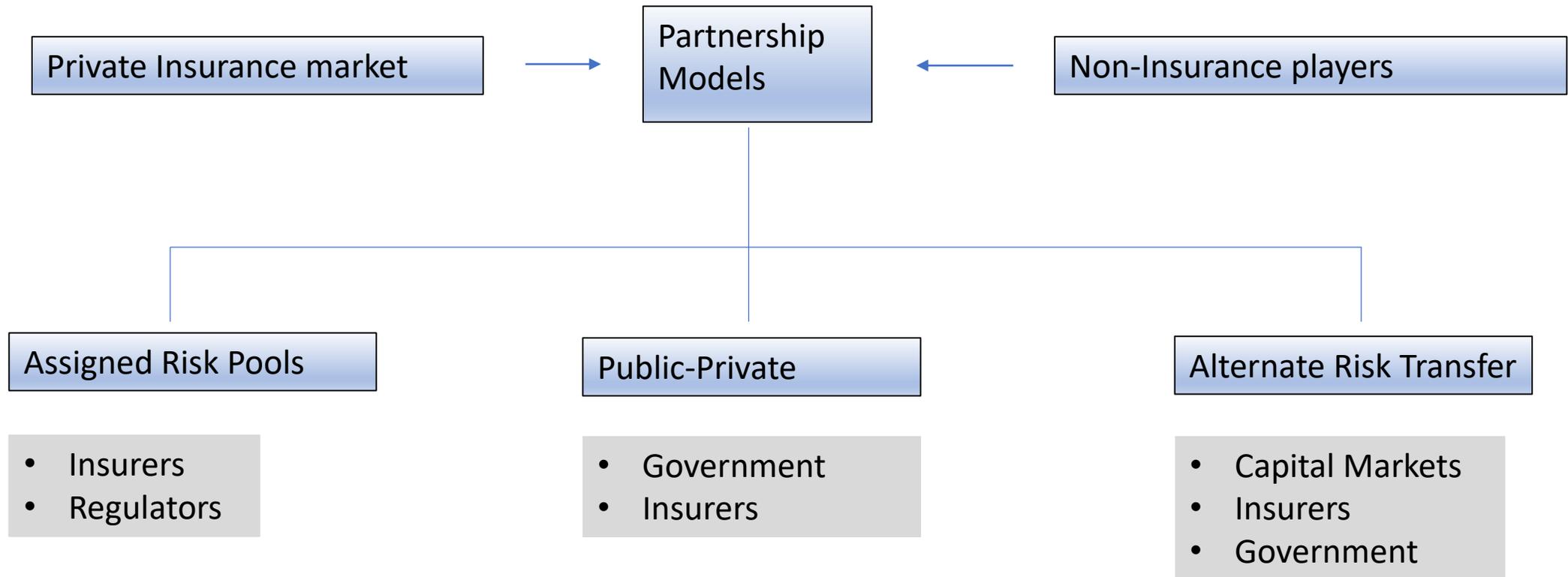
- Many businesses lost money
- Knock on effect on employment
- Pandemic BI has affected public at large
- Policyholder expectations vs Insurance policy exclusions
- Finding reasonable mechanisms to transfer an otherwise uninsurable risk



Hard to insure risks



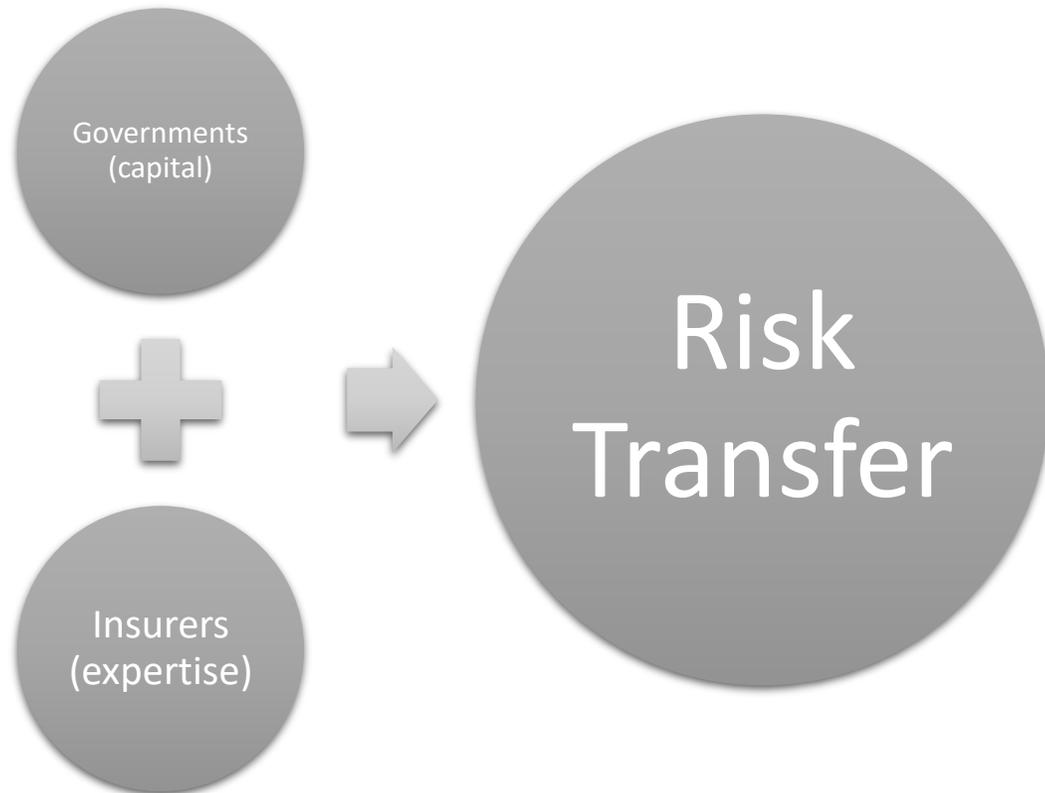
Solution Landscape



Public and Private Partnerships



Public – Private Partnerships (PPP)



- Risks traditionally considered uninsurable
- Risks needing extremely large capital sums
- Risks that become a matter of public policy
- Good template to embrace as a starting point for prompt response

Assigned Risk Pools

Insurers unwilling to cover high risk individuals or businesses

Mandated by regulators to come together and provide coverage

Shared premium and losses

Assigned Auto Pools

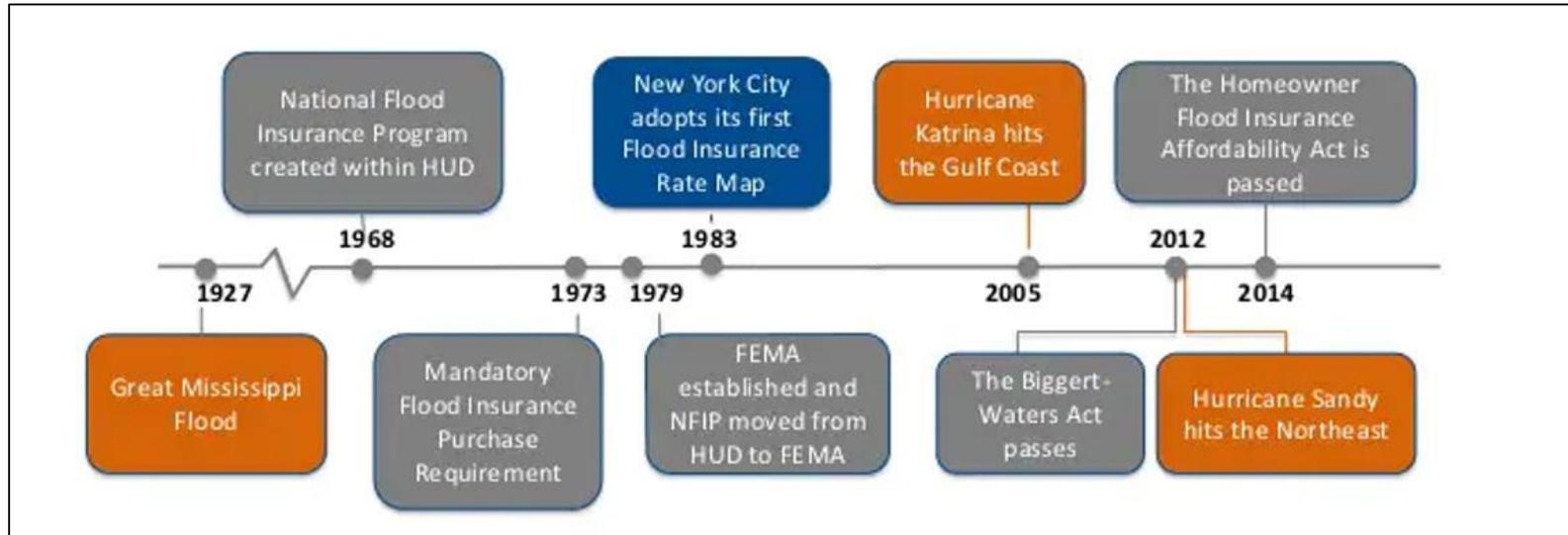
Second Injury Funds

Would this work for Pandemic BI?

Limited by collective Insurance capacity



PPP – US Flood Insurance



- Most common and costly natural disaster
- Historically, considered an uninsurable risk
- No mortgage if not covered

- NFIP – Insurers administer, Government sets the premium and picks up the claims
- Funding concerns
- Advancement in modeling techniques over time
- Legal Acts removed rate subsidies
- Private insurance participation gradually increasing
- Model for Pandemic BI

PPP – Terrorism

- Terrorism risk covered historically, considered uninsurable post 9/11
- Unpredictable, non-accidental, challenge to price
- No insurance = No loans for commercial projects
- Government provides the *Backstop*
- Insurers cover the first losses before federal government assumes risk
- Controls in place to limit Government exposure
- Not a typical RI arrangement – no RI premiums, no RI reserves
- Another reasonable model for Pandemic BI requiring Insurers to have some skin in the game!



PASSED
TRIA

PPP – key variables

Risk Assumption

Premium Determination

Affordability

Coverage

Efficiency

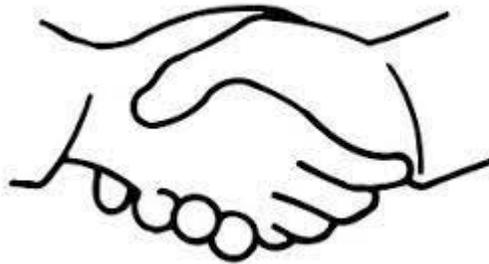
Alternate Risk Transfer



Alternate Risk Transfer (ART)

- Participation of wider capital markets in the insurance system
- Availability of broader capital base

Insurers

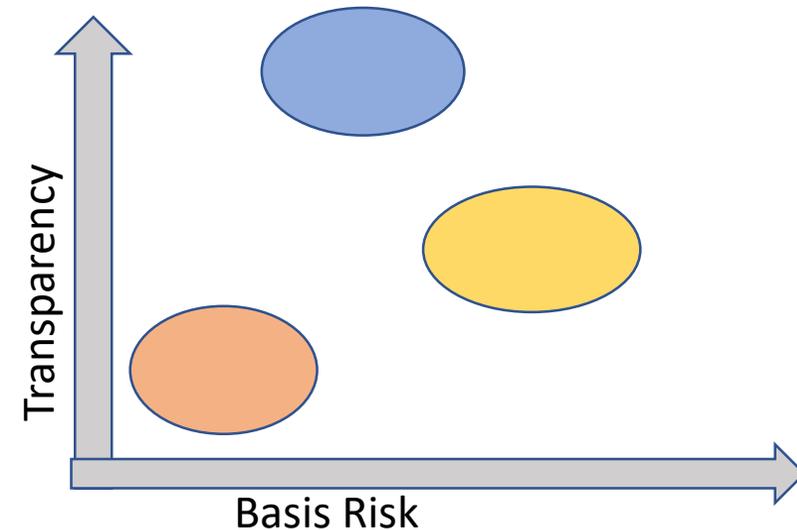
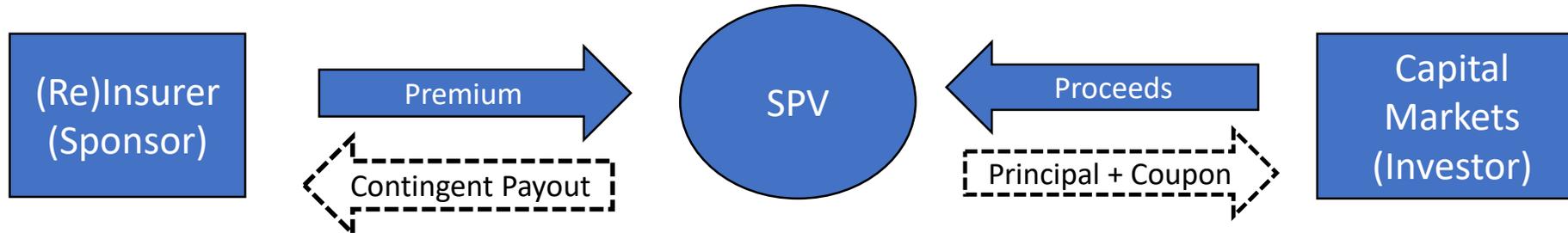


Capital Markets

- Diversification benefits: Improved risk-return profile
- Increased ability to insure risks needing larger capital backing

ART – CAT bond Primer

- Insurance Linked Securities - financial instruments that derive value from insurance risk trading
- Catastrophe (CAT) Bonds form the most common example



ART – Parametric Insurance

- Particularly useful for Pandemic BI
- Transparent and quick claim settlement
- Some relevant parameters
 - Pathogen Sentiment Index (Metabiota)
 - Footfall metric (Springboard)
 - Apple’s COVID-19 Mobility Trends Reports
 - Google’s COVID-19 Community Mobility Reports
 - Civil authority orders
- Triggers conditions should be kept relatively simple



PARAMETRIC RISK INSURANCE

APPLICATIONS IN AGRICULTURE, CLIMATE
AND DISASTER RISK AND PANDEMICS



THE WORLD BANK

Treasury

Miguel Navarro-Martin
Head of Banking Products
February 2017

ART – Existing Blueprints (Multiple Industries)

- Pathogen Rx (2018) - financial protection against the risk of business interruption due to an infectious disease outbreak
- Modeled using Metabiota’s infectious diseases database
- Possible triggers -
 - mortality / no. of infections in a predefined area
 - civil authority’s imposition of a lockdown
 - declaration of a public health emergency
- Indemnity protection - can cover loss of profits, loss of revenue, and extra expense incurred
- Among existing options, this product would have been closest to providing indemnity protection during the coronavirus pandemic. Unfortunately, it did not gain much attention from risk managers until the event happened.



PathogenRX: An Exclusive Analytics and Insurance Solution for Outbreaks, Epidemics, and Pandemics



ART – Existing Blueprints (Hospitals)

- AXIS Healthcare Medical Catastrophe Business Interruption and Extra Expense (2016)
- Business interruption insurance for U.S. and Canadian hospitals
- Protection against a loss of revenue caused by the outbreak of a wide range of potential pandemics or contagious diseases
- Essentially a parametric product, structured using four triggers – only one trigger would make the policy respond
 - A government quarantine of a hospital
 - A 25% threshold for absentee medical personnel
 - A 25% threshold for reduction in inpatient stays
 - A 25% threshold for reduction in emergency room visits
- Coverage limited to 12 months from the trigger date
- Triggers that reflect a reduction in business activity with controls around period of coverage can help design feasible products that respond to revenue loss

A person is standing in a server room, holding a laptop. The room is filled with server racks, and the lighting is dim, with some red lights visible on the racks. The person is wearing a dark jacket and is looking at the laptop screen. The background shows a long aisle of server racks receding into the distance.

Partnerships - An Asian Example

- World's first Commercial Cyber Risk Pool launched by Singapore (2018)
- Brings traditional insurance and Insurance Linked Securities markets together
- Emerging risk - low historical data to support risk assessment, pricing and underwriting

Conclusion



Key points

- COVID BI was uninsurable
- Not all risks are insurable in the private market
- Public and private partnerships offer a method to address uninsurable risks
- Where public options don't exist, alternate risk transfer access the capital markets for risk management

Questions?

