GUY CARPENTER

NAIC CIPR Spring Event on Pandemics

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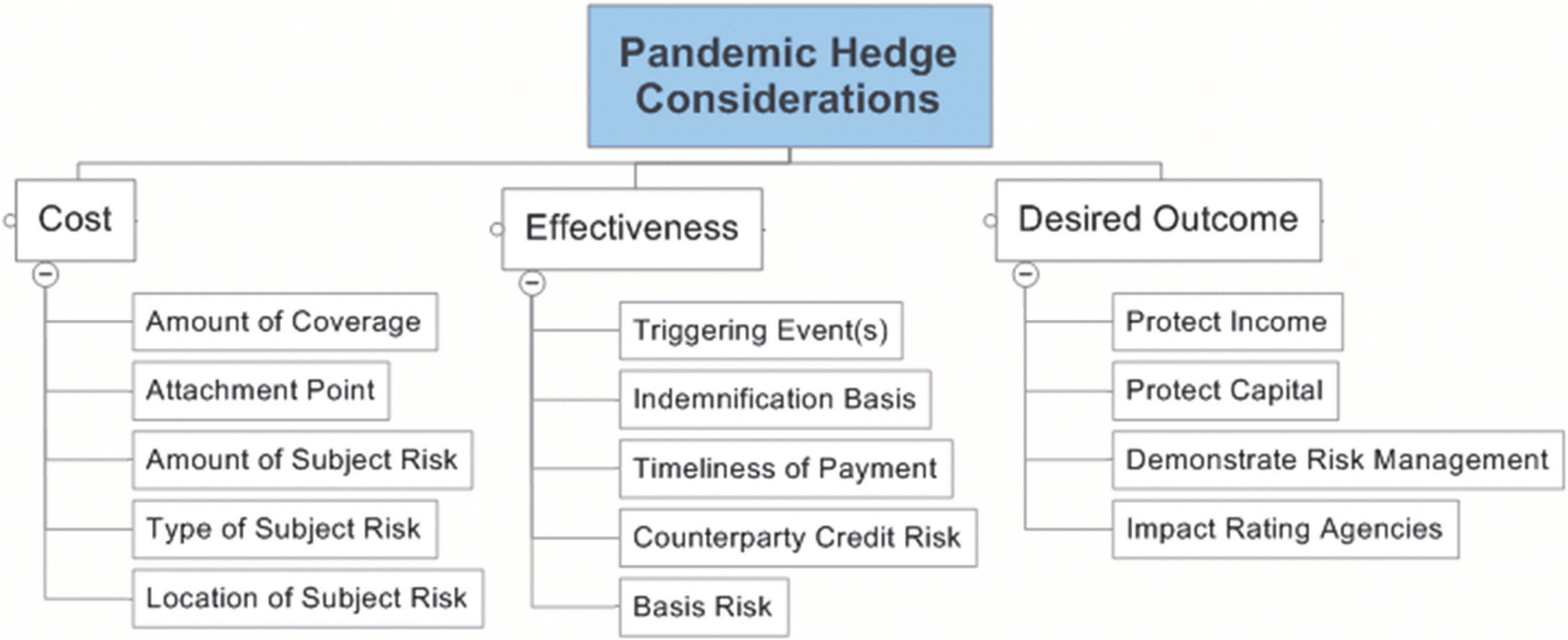
HEALTHCARE & LIFE
SPECIALTY PRACTICE

Pandemic Solutions
Key Considerations



Multiple pandemic hedging options may be available. The optimal strategy will depend on specific objectives, budget and risk tolerance.

Hedging Strategies
Priority Considerations Worksheet

Consideration	Priority (1 - 5; 1 High, 5 Low)	Comments
Perils to include (e.g., Pandemic, Terrorism, NBCR, Earthquake, etc.)		
Retention and limits		
Structure type		
Counterparty credit risk		
Contract term		
Ability to track claims back to an event		
Price / Hedging budget		
Basis Risk		
Impact on Risk Capital		
Timing		
Execution Risk		

Pandemic Hedging Strategies
Alternative Solutions

- Pandemic Catastrophe Reinsurance
- Stop Loss Reinsurance
- Industry Loss Warranty (ILW)
- Extreme Mortality Bond
- Business Mix Mitigation
- Contingent Capital

Pandemic Solutions
Overview of Hedging Strategies

Characterisitcs	Pandemic Cat	Stop Loss	ILW	Mortality Bond
Perils Covered	Any combination of Pandemic, Terrorism & Earthquake	All Perils	Pandemic	All Perils but Effectively War and Pandemic
Other Key Features	Multi-peril, No-claims Bonus	May include secondary trigger	Industry Loss Trigger and Payment Formula	Multi-national currency and index mechanism
Available Capacity	\$200M - \$400M	\$100M to \$200M	Unknown	\$500 Million+
Must Have Ability to Track Claims to an Event	Yes	No	No	No
Basis Risk	None, if losses can be tracked to an event	None	Yes	Yes
Counterparty Risk	Yes	Yes	Yes	No
Contract Term	Annual	Annual or Multi-Year	Annual or Multi-Year	Multi-Year
Estimated Rate on Line Pricing	4 - 8% ROL	5-10% ROL	4-8% ROL	2 - 6% ROL

Pandemic Catastrophe Coverage

Features

- Modeled after catastrophe reinsurance and may be included as a loss cause
- Indemnifies losses for a specific loss cause after retention and up to a defined limit
- Definitions attempt to cover losses from a several month long period with a reinstatement

Advantages / Disadvantages

- Reasonable analogs for the “hours” and “radius” clauses from catastrophe reinsurance can be problematic.
- Connecting losses to the defined loss cause may be difficult
- There should be no expected savings over separate coverages as the loss causes are uncorrelated
- Reinstatement premiums for both coverages after a loss for one is unfavorable to the cedant

Recent Development – Pandemic Catastrophe Put Option

Stop Loss Cover

Features

- Pays indemnity benefits in excess of attachment point up to specified limit
- Treaty responds to any loss cause

Advantages / Disadvantages

- Wider marketing scope than pandemic-specific cover
- Matching claims to loss cause not an issue – no basis risk
- Capacity limited, as most writers with familiarity with underlying risk have pandemic exposure
- Coverage for a subsequent pandemic wave could be problematic as pricing and capacity for renewals will respond strongly to a loss

Secondary triggers may be used to focus application to Pandemic Risk. Impact to price depends on attachment point.

Pandemic Industry Loss Warranty

Features

- Popular for hurricane reinsurance, this protection has a non-client-specific parametric trigger with indexed benefits
- Upon a defined event, the cover is activated and may pay up to the limit purchased in a proportion of losses relative to industry losses.

Advantages / Disadvantages

- Capacity will likely not be significant as few players entertain this coverage
- A trigger for this loss cause would likely be at an extreme level – ex. 1/250
- Indexed benefits could introduce significant basis risk
- A more active market could introduce refinements to create a more robust option

Pandemic ILW s have been discussed but not yet been pursued. They are mentioned here, as they are similar vehicles for insurance markets as Extreme Mortality Bonds are for capital markets.

Pandemic Solutions
Extreme Mortality Bond

Features

- Upon a triggering change in a defined index, pays benefits up to limit based on the magnitude of the change in index
- The index is cause neutral, but the only loss causes that could be expected to move the index significantly are pandemic and war
- Often include multiple tranches, with different attachments and costs

Advantages / Disadvantages

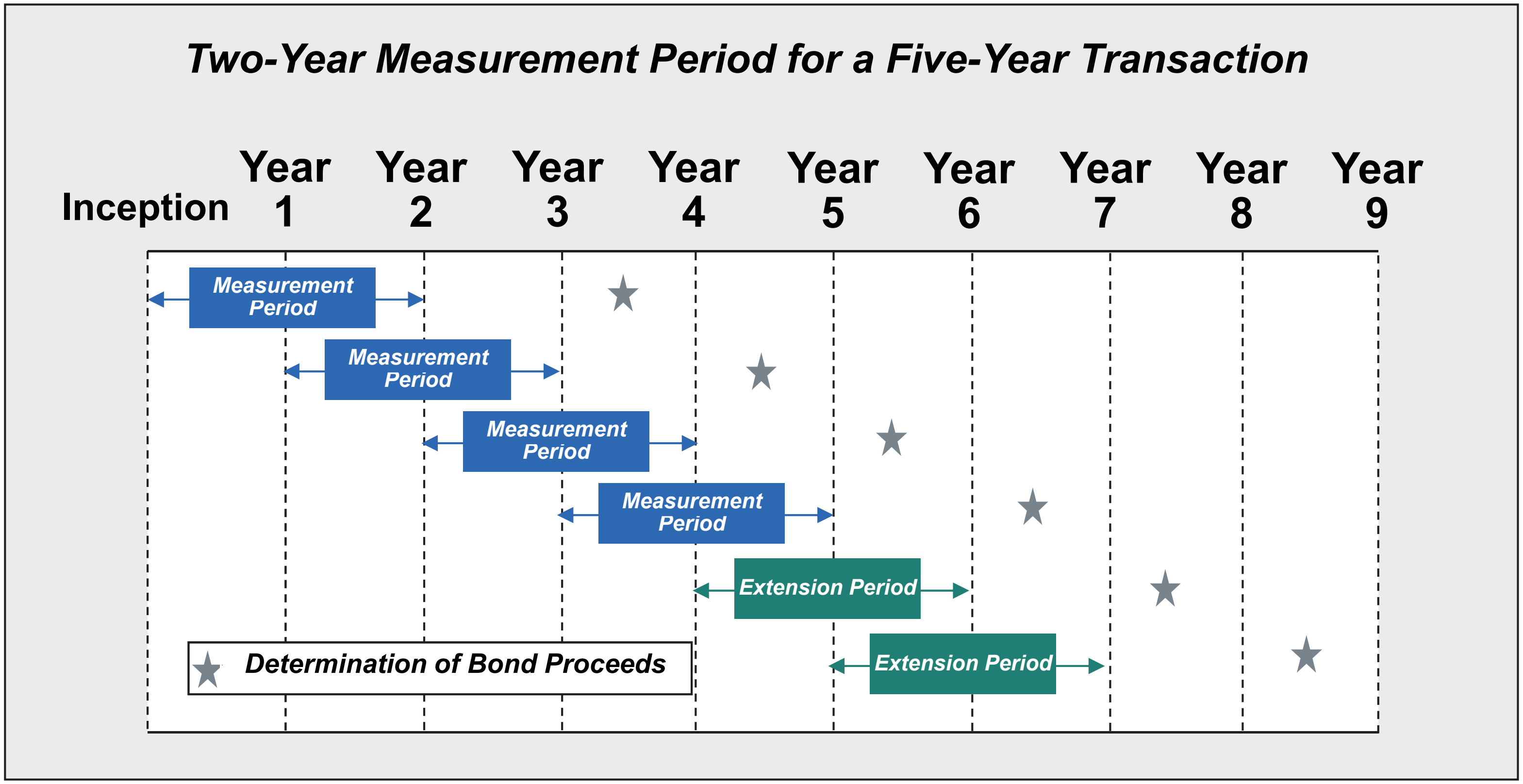
- Structure removes significant counterparty risk from transaction
- Basis risk has been an issue, as the trigger and benefits have been parameter-based rather than indemnity-based
- With >$3B issued so, the market is familiar with the basic structure
- There can be significant lapse between loss and payment, providing no liquidity benefits

Extreme mortality bonds offer the greatest potential for very large capacity. Enhancements could overcome basis risk and timing of payment shortcomings

Basis Risk Analysis

Basis Difference	Risk
Demographic differences in Index and Sponsor populations	Sensitive to shape of excess mortality
Impact of pandemic flu on insured population v. Index population	Direction and size of difference unclear
Difference in distribution of count v. insured amount	Sensitivity to shape of excess mortality
Material change in Sponsor demographic mix	Age/sex mix could change over term
Mortality improvement in Index population	Dampens pandemic benefit trigger
Intra-cell demographic differences	Some age mix remains
Sponsor mortality likely much lower than Index mortality	Small changes affect large percent of profits
Measurement period	Significant deviation in mortality may not trigger bond

Pandemic Solutions -- Extreme Mortality Bond
Illustration of Liquidity Risk



Due to the long time period needed to determine deviation from expected mortality, assessment of parametric bond proceeds can take at least two years following a pandemic event, long after benefits have been paid.

Mortality Catastrophe Bonds
Considerations for New Issues

Trigger type

- Parametric index versus indemnity

Cover type

- Cumulative aggregate versus annual per occurrence

Protection term

- Up to 10 years may be possible for annual cover

Transaction size

- Immediate issue
- Shelf program

Multi-peril

Mortality Catastrophe Bonds
Trigger Comparison

Mortality Rate Trigger Type	
Parametric Index	**Indemnity**
Advantages: ▪ Transparent trigger based on third party country-based mortality rate data ▪ Precedents demonstrates capital markets acceptance of the underlying risk and transaction structure ▪ Quicker to implement relative to an indemnity trigger ***Considerations:*** ▪ Country mortality rates (and certain regions within) may vary substantially from a particularly sponsor's portfolio mortality rates ▪ Up to a two year lag in reporting of country mortality rate tables by the various governmental agencies could slow payments to the sponsor	***Advantages:*** ▪ Indemnity trigger could be based on a sponsor's actual portfolio mortality rates ▪ Could best hedge adverse mortality risk on the subject portfolio ▪ Could reflect the cedent's strong reinsurance underwriting practices ▪ Payments to the cedent may be speedier than a parametric index based on country-based mortality rates ***Considerations:*** ▪ Administratively challenging and time consuming to gather and model the entire target portfolio ▪ Longer implementation time relative to parametric index trigger ▪ Upon implementation, requires ability to track mortality rates of entire covered portfolio ▪ Reporting mechanism of mortality rates will be a key topic for investors

Mortality Catastrophe Bonds
Deal Summaries

Year	Deal Name	Sponsor Name	Expected Maturity	Risk Period	Risk Amount ($MM)	Tranche	Spread (in bps)	Exp Cost (in bps)
2003	Vita Capital Ltd.	Swiss Re	1/1/2007	4 years	400	Notes	135	1.60
2005	Vita Capital II Ltd.	Swiss Re	1/1/2010	5 years	62	B	90	0.73
					200	C	140	4.11
					100	D	190	14.58
2006	Tartan Capital Ltd.	Scottish Re	1/7/2009	3 years	75	A*	19	5.00
					80	B	300	18.00
2006	Osiris Capital p.l.c.	AXA	1/15/2010	4 years	129	B1*	20	7.30
					65	B2	120	7.30
					150	C	285	17.80
					100	D	500	37.40
2007	Vita Capital III Ltd.	Swiss Re	1/1/2011	4 years	100	A-IV*	21	3.20
			1/1/2012	5 years	100	A-V*	20	3.10
			1/1/2011	4 years	71	A-VI*	21	3.20
			1/1/2012	5 years	129	A-VII	80	3.10
			1/1/2011	4 years	90	B-I	110	3.90
			1/1/2012	5 years	50	B-II	112	3.70
			1/1/2011	4 years	39	Class	110	3.90
			1/1/2012	5 years	50	B-V*	21	3.70
			1/1/2011	4 years	71	B-VI*	22	3.90
2008	Nathan Ltd.	Munich Re	1/15/2013	5 years	100	A-I	135	4.69
2009	Vita Capital IV Ltd.	Swiss Re	1/15/2004	5 years	75	E	650	0.46
2010	Vita Capital IV Ltd.	Swiss Re	1/15/2014	4 years	50	II- E	525	0.46
2011	Vita Capital IV	Swiss Re	1/15/2016	4 years	100	Series V	280	0.24
					80	Series VI	385	0.68
2012	Vita Capital V	Swiss Re	1/15/2017	4 years	125	D-1	270	0.30
					150	E-1	340	0.64
	Mythen Re 2012-2		1/15/2016	4 years	120	A**	850	0.26
2013	Atlas IX Re	SCOR	1/17/2019	6 years	180		300	92.0

Pandemic Solutions
Indirect Hedges

- Business Mix Mitigation
  - Take a long position on longevity risk by assuming payout annuity, structured settlement or senior life settlement risks through direct acquisition or via a swap structure
  - Not recommended as there are several disadvantages
    - The time required to accumulate sufficient offsetting risk could be long
    - This approach could be very capital intensive
    - Basis risk will be potentially significant
- Contingent Capital
  - Provides liquidity protection in the case of a triggering event
  - Not true indemnity cover as proceeds must be repaid
  - May note be available in certain financial markets

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