

**CLIMATE CHANGE AND
INSURANCE:
SOME ISSUES AND A
RESEARCH AGENDA**

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I. INTRODUCTION

II. CLIMATE CHANGE AS A COMPOUND LOTTERY

- **STAGE 1.**
- **STAGE 2.**

III. SHORT TERM RE-CONTRACTING FOR STAGE 2 RISK.

- ***III. a. Climate Change and Insurable Risk Exposures.***
- ***III. b. Climate Change and Concurrent Ambiguity.***
- ***III. c.. Summary of Short Term Insurance Markets Under Climate Change***

IV. LONG TERM CONTRACTING OF STAGE 1 RISK

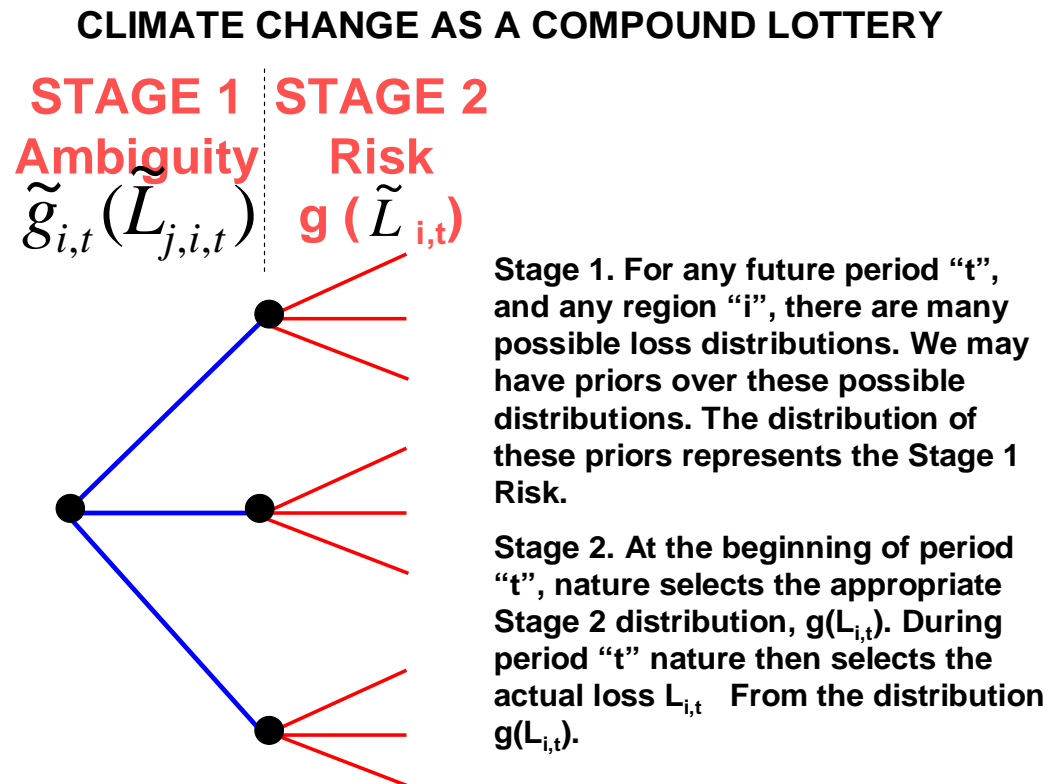
- ***IV.a. Voluntary Insurance of Stage 1 Climate Change Risk and the Dominance of Long Term Contracts.***
- ***IV.b. Involuntary Insurance of Stage 1 Risk Through Regulation, Legislation and Retroactive Litigation***
- ***IV.c. Summary of Voluntary and Involuntary Insurance of Stage 1 Risks.***

II. CLIMATE CHANGE AS A COMPOUND LOTTERY STAGE 1.

- Long term ambiguity.*
- Serial Correlation.*
- Smooth or Jerky.*

STAGE 2.

- Concurrent Ambiguity.*
- Changes in contemporaneous correlation.*



II. CLIMATE CHANGE AS A COMPOUND LOTTERY: STAGE 1.

Long term ambiguity.

Serial Correlation.

Smooth or Jerky.

$$\tilde{g}_{i,t}(\tilde{L}_{j,i,t}) \text{ WHERE } \tilde{g}_{i,t}(\cdot) \text{ CERTAINTY EQUIVALENT} = \tilde{C}_{j,i,t}$$

STAGE 1 AS WEINER PROCESS

$$\tilde{C}_{j,i,t} = \text{DRIFT TERM} + \text{VOLATILITY TERM}$$

VOLATILITY TERM = CORRELATED RISK + IDIOSYNCRATIC RISK

II. CLIMATE CHANGE AS A COMPOUND LOTTERY

STAGE 1.

STAGE 2.

Concurrent Ambiguity.

- Bayesian Updating each year to estimate distribution
- Model updating too
- Sensitivity of updates increases with volatility of prior
- Thus one recent storm can lead to large shift in estimated distribution (NB climate change not necessarily smooth)

Changes in contemporaneous correlation.

- Crucial for insurability: current science can say little about future correlation

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II. CLIMATE CHANGE AS A COMPOUND LOTTERY

III. SHORT TERM RE-CONTRACTING FOR STAGE 2 RISK.

- *III. a. Climate Change and Insurable Risk Exposures.*
 - *Changing hazard risk.*
 - *Moving into Harm's Way.*
 - *Sub Optimization of Fixed Investment in a Changing Climate.*
 - *World economic development and rebalancing of insured risk pool.*
 - *Growth of Insurance Linked Securities*
- *III. b. Climate Change and Concurrent Ambiguity.*
 - *Updating on new information.*
 - *Premium Instability.*
 - *Belief based agency problems.*
 - *A complacency cycle in insurance coverage.*
 - *Ambiguity Aversion.*
- *III. c.. Summary of Short Term Insurance Markets Under Climate Change*

IV. LONG TERM CONTRACTING OF STAGE 1 RISK

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IV. LONG TERM CONTRACTING OF STAGE 1 RISK

IV.a. Voluntary Insurance of Stage 1 Climate Change Risk and the Dominance of Long Term Contracts.

- ***Capital and Solvency Issues with Long Term Contracts.***
- ***Long Term Contracts and Optimal Mitigation.***
- ***The Option to Re-build & Option to Renew Exhausted Contracts.***
- ***The Enforceability of Long Term Contracts.***

V.b. Involuntary Insurance of Stage 1 Risk Through Regulation, Legislation and Retroactive Litigation

- ***Price suppression and Constraints on Exit.***
- ***Mandated Reinsurance Pools***
- ***Contract Re-Interpretation***

IV.c. Summary of Voluntary and Involuntary Insurance of Stage 1 Risks.