



# *Thoughts on the Peculiar (Nay "Freaky") Economics of Insurance*

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- Insurance and the Information Problem
  - Information Problem Defined
- “Imperfect” Information and Incentives in Action:
  - Credit Scoring, or the Equity Problems of Segregating Good Risks from Bad Risks
  - Climate Change, or the Lethal Costs of Not Knowing What’s Going On
  - Reinsurance, or The Limits of “Hot Potato”



Insurance is an odd product for many reasons, including

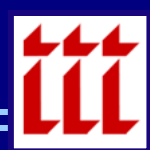
- The cost of the product are under the joint control of both sellers and the buyers who have diametrically opposed interests;
- The cost of the product is not known until after it is sold;
- Buyers do not understand that the purpose of the product is protection against the financial consequences of risk.



1. Insurers must guess the frequency and severity of losses in order to set prices, accumulate capital and pursue optimal financial and risk management policies in light of their goals.
2. Insurers must design policies in order to provide coverage while countering policyholder incentives to hide important information affecting the size of losses, or take actions that increase the frequency or severity of losses.



1. The public tends to underestimate the frequency of large loss events (both because of limited experience as well as cognition issues identified by the late Amos Tversky and Nobel laureate Daniel Kahneman) while overestimating the likelihood of high frequency, low loss events.
2. Result: Public behaves as if the probability of low frequency, high loss events is zero (hurricanes) or far below actual risk.
3. Two distinct problems here:
  - Public discounts big risks too much
  - Public has difficulty understanding nature of risk



## Example: The 100 Year Flood Plain

Basic Issue: Most people do not see why a 1% chance of flooding in each separate year must mean that the chances of flooding rise sharply over many years (or that flooding is a certainty given enough time). This is a fundamental cognitive problem linked to poor math skills.

Years Passed	Odds of a Flood
0	1%
1	1.99%
2	2.97%
3	3.94%
10	9.56%
20	18.20%
30	26.03%
50	39.49%



- Insurers have powerful incentives to acquire information in order to improve their capacity to guess the cost providing protection.
- Buyers have powerful incentives to hide information (adverse selection), rely on protection in the face of danger (moral hazard), or ignore risk altogether because of limited cognition.
- Insurers must be allowed to acquire relevant information in order to price risks while limiting exposure to insureds who engage in risky behavior because they are protected.



- Information is costly in many different ways:
  1. Private costs: expensive to acquire, process, transmit and store,
  2. Social costs: a greater ability to discriminate between high and low risk situations permits more accurate pricing at the cost of greater social friction due to greater knowledge and transparency.



# Credit Scoring, or the Problems of Segregating Good Risks from Bad Risks



Insurance scoring used by companies permits better prediction of losses, which in turn permits insurers to identify and price high and low cost risks.

Use of statistical techniques – regression, factor analysis and stochastic modeling – along with the ever cheaper cost of large scale computing create better estimates of losses for finer classifications of risks.



Insurance scoring is not unlike the SAT – a cheap method for evaluating the prospects of a large and extremely diverse population.

However, like the SAT, insurance scoring is a the messenger of bad news because it reduces the subsidy from low cost drivers to high cost drivers while revealing the sources of cost disparities between populations.



- Insurers that cannot distinguish between low and high cost risks are de facto Robin Hoods who redistribute money and opportunity from low to high loss agents.
- The argument against credit scoring is an argument for sneaky taxes to be imposed and managed by insurers via premiums.
- Basic economics favors transparent taxes over sneaky taxes since life is always better when prices reflect costs – or, in this case, when premiums reflect losses.



## Example: Simple Arithmetic of Insurance Scoring

Imagine a region comprised of an equal number of three types of drivers whose accident frequencies, loss costs and pure insurance premiums are shown below.

Driver Type	Ins Score	% of Population	Accident Freq.	Loss	Premium with No Scoring	Premium with Scoring
Low Risk	High	1/3	1/1000	\$1000	\$15	\$1
Medium Risk	Medium	1/3	1/250	\$2000	\$15	\$4
High Risk	Low	1/3	1/100	\$4000	\$15	\$40

Without insurance scoring, low and medium risk drivers are paying far more in premiums than the costs they transfer to insurers, while high risk drivers are receiving a substantial subsidy of **\$25**. Insurance scoring reduces the costs of coverage to the majority of drivers (2/3 in this case) while forcing high risk drivers to pay for the costs they transfer to insurers. Indeed, rising premiums for high cost drivers might lead to fewer accidents and lower medical costs if this group drives less in response to greater insurance cost.



- High cost drivers tend to be poor, non-white and located in cities. Insurance scoring is a form of “statistical discrimination” that segregates high cost from low cost drivers with the unfortunate side effect of separating white from non-white drivers.
- Insurance scoring reveals that poor people living in urban areas with high auto repair and medical costs as well as high collision rates are high cost risks.
- Bans on insurance scoring simply hide this problem by imposing hidden taxes on low cost drivers while ignoring the sources of high costs. This is a form of denial in a face of difficult structural problems.

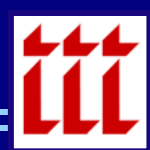


# Climate Change, or the Lethal Costs of Ignorance



Two **immediate** information problems involved in the economics of climate change – particularly global warming:

1. **Scientific uncertainty**: growing scientific consensus on global warming not matched by capacity to model or predict extreme weather events,
2. Scientific uncertainty combined with regulatory constraints – ***weirdness*** – presents obstacles to properly pricing the property risks associated with climate risks.



Two **long term** information problems linked to climate change:

1. Insurance prices do not and cannot be relied on to price **prospective** climate risks, even though many and perhaps most insured activity contributes to climate risk. Insurance prices can only price **historical** climate risks.
2. Property losses associated with global climate change will rise, with the consequence that insurance premiums will not only rise, but may rise far faster than ordinary measures of inflation. The most efficient and **equitable** to pricing property risk associated with climate change is to allow free market pricing in P/C markets in order to reduce the long term financial and social costs of climate change.



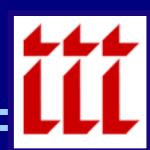
### Climate Change and Extreme Weather Risk

1. Scientific consensus on the fact of global warming as well as on the fact of anthropogenic contributions to warming **but,**
2. No consensus on when, where or how global warming will effect weather patterns – including the frequency, severity, location or damage done by hurricanes, tornadoes, heat waves, torrential rains or rising sea levels – despite agreement that these outcomes are the inevitable result of warmer oceans and greater levels of humidity.



Climate change is an uncertain, ***long term*** source of property losses. Far more important and ***immediate*** problems include:

1. Increasing size and density of coastal populations;
2. Increasing accumulations of property in coastal regions;
3. Perverse pricing and regulatory mechanisms that actually encourage people to move into harm's way.



Climate change is chaotic process:

1. Very complex, multidimensional process that alters the way weather works, thereby threatening to undermine the capacity of insurers to use past loss experience to predict the future;
2. Chaos is a property of a complex system whereby small changes in one part of the system alter the operation of the entire mechanism in unpredictable ways precisely because the system has so many interacting parts.
3. The behavior of a chaotic system – like climate – can be radically different as a result of small changes that push it beyond a “tipping point”, thereby making past observations of a process irrelevant for predicting its future.



Insurance ***necessarily*** assumes away chaos in favor of processes with stable distributions of losses thereby making it possible to calculate probabilities because specific patterns of loss recur.

Chaotic processes are systems for which history cannot be used to predict the future because the new system is radically different from what preceded it. The new relationships will only be known with the passage of time, perhaps a great deal of time.



Insurance is well-suited to handle gradual climate change because:

1. Loss patterns change gradually, thereby allowing insurers to continue to use updated past information as a guide to the future;
2. Insurers can make good predictions about future losses based on information about new loss trends so long as there is no radical shift in the connection between perils, losses and behavior.
3. Evidence on climate change points to gradual climate change as the most likely scenario, though scientific uncertainty about the nature of the globe's climate require caution.



The events of the past couple of years show that insurers can withstand a series of large losses and recover nicely through a combination of adroit risk management, financial management and cost control.

***The good news:*** gradual climate change that presents itself as a series of gradually escalating extreme weather events can be smoothly handled if insurance markets are permitted to price risks.

***The bad news:*** population trends combined with questionable policy choices may present insurers will extremely tough choices ahead



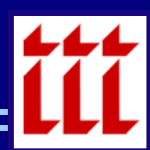
Prices in competitive market economies collect and convey information in society in a manner that coordinates a highly fragmented and complex division of labor, thought and finance.

A persistently high price for any good or service provided by competitive markets – including insurance – means that the costs of production are high. In the case of insurance, persistently high and rising premiums means that actual and prospective losses are large.

So long as markets are competitive, persistently high insurance prices cannot be the result of collusion or illegal anti-trust behavior because high profits shift the allocation of capital toward insurance, away from other sectors of the financial services industry.



- Mounting insured losses due to extreme weather will push up insurance costs and therefore premiums.
- Higher premiums encourage risk avoidance (move out of harm's way), risk control (building codes, "harder" buildings, etc.), and risk mitigation efforts.
- Reallocation of resources to either avoiding or reducing risk is the only method for effectively dealing with escalating weather risk.



1. Recent rate increases in Texas and Florida as well as Allstate's decision to reduce their exposure in the market for homeowner's insurance in Long Island, NY reflect the basic fact that insurers' need higher rates to cover perceived long term increases in loss costs.
2. Good public policy suggests that the current system of price controls in the market for homeowner's insurance is exactly the wrong policy given
  - a. Rising coastal populations
  - b. Rising property values due to housing boom
  - c. Need to alter incentives for living along coasts



1. Residual markets for high risk properties provide a government to subsidy to high risk activities.
2. Two kinds of economic waste:
  - a. Excessive exposure of people and property to risk by cost sharing with low risk populations and
  - b. Excess use of disaster resources in the event of catastrophes – whether auto accidents or, in this case, hurricanes.



Price controls combined with residual markets for homeowners' insurance are, from an economic point of view, a sneaky subsidy to real estate interests and mortgage lenders via insurers, with low cost of homeowners taxed for the benefit of high cost homeowners.

**Winners:** mortgage banks see higher demand for loans; real estate experiences a higher demand for housing; current homeowners reap capital gains in markets for existing housing.

**Losers:** insurers face lower profit margins and therefore reduce their supply of capital; low cost homeowners face higher insurance rates due to (a) the capital shortage and (b) the tax imposed by government to provide insurance via the residual market.



1. Risk based pricing, especially in coastal states, will reduce incentives for locating along coastal areas;
2. Higher prices and profits will increase supply of capital by encouraging entry by more insurers, thereby increasing competition;
3. Result: insurance premiums will reflect risks; insurance will be more plentiful and affordable to smaller population capable of bearing risks.



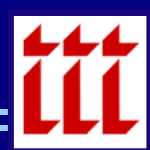
Suppression of insurance prices and profits in favor of real estate driven development increases long run losses and human suffering due to excessive exposure to high risk outcomes.

Yet, risk-based pricing reduces the extent of economic development by forcing producers and consumers alike to take account of the full costs of activities, including the costs of prospective losses.

Basic economic insight: a public policy is sensible if, but only if, the benefits of that policy – in both financial and fairness terms – exceeds the costs.



1. Do the benefits of the price control regime in homeowners' insurance markets exceed the costs – both in terms of finances and fairness – particularly along coastal regions?
2. Will the benefits of price controls continue to exceed the costs if the frequency and severity of losses increases as a result of global climate change?



- Will escalating weather risk under climate change price poor and middle class folks out of coastal areas? Yes.
- Is this an equitable state of affairs? Absolutely. Indeed, economic and social justice demand that economically vulnerable people be excluded from high risk zones.
- Will market based pricing reduce economic development in high risk regions? Yes, and it should in all high risk regions where the cost of price controls under the current regulatory regime exceed the benefits.



Price controls and residual market mechanisms suppress information by distorting prices, thereby preventing the gradual re-arrangement of housing and population patterns into safer configurations in the face of climate risk.

Market-based insurance pricing is vital to rational and effective economic adjustment to climate risks precisely because prices will guide people and property out of harm's way in the long term.

Market based pricing is a vital part of the reallocation of global capital toward insurance and away from accumulation-based finance that must happen to counter the weather consequences of climate change. *Put bluntly, more capital must be used for protection and less for development given the fact of global warming.*



# Reinsurance, or The Limits of “Hot Potato”



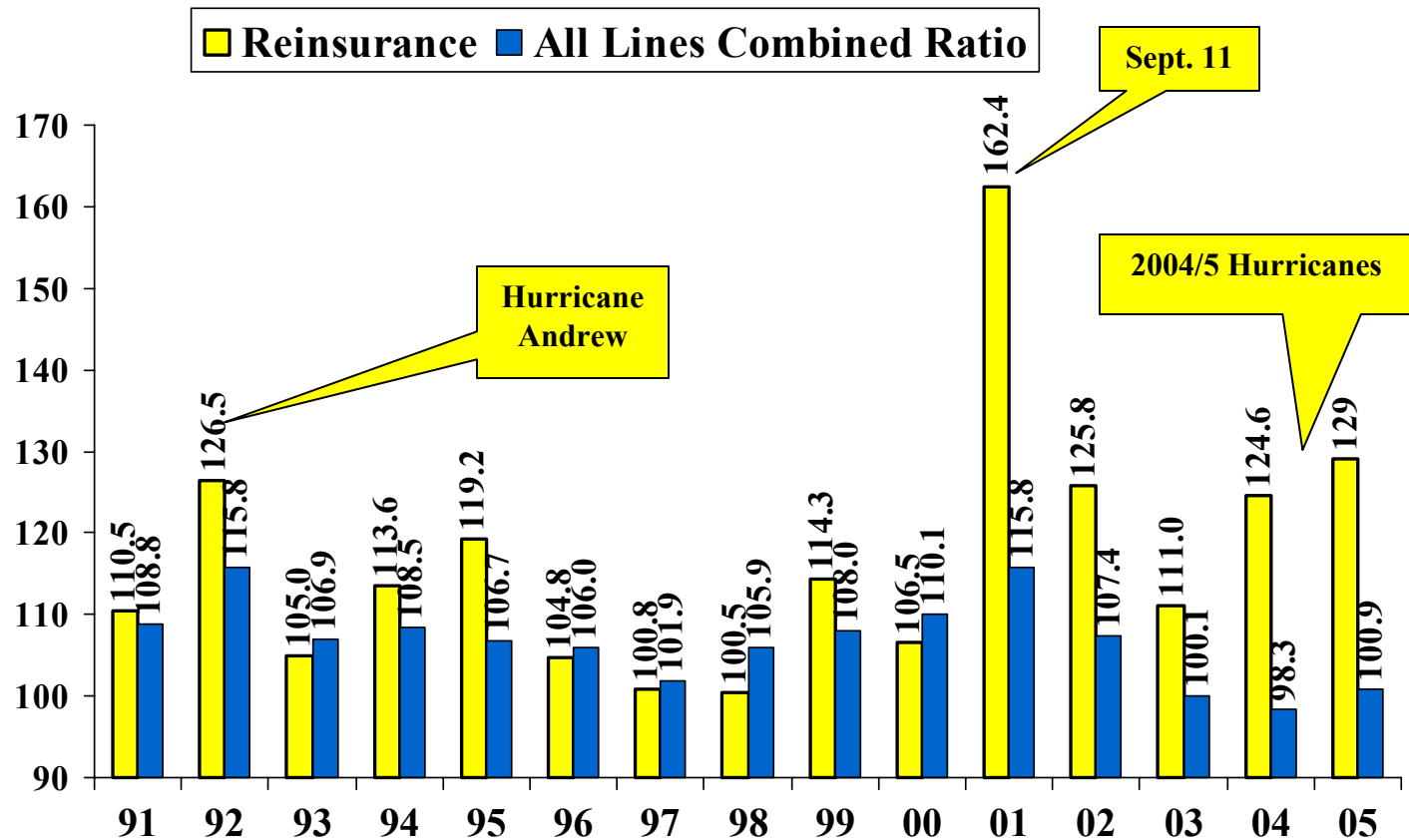
- Global capital markets allocate the global supply of savings to finance both capital accumulation (growth) and capital protection (insurance) in response to the balance of risk and return in all markets.
- Reinsurance markets price, transfer and fragment the risks faced by primary insurers on the basis of global savings and the demand for savings in all other sectors.

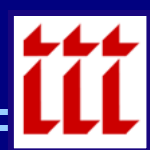


- The paradox of insurance profits in the aftermath of catastrophe: high profits after catastrophe is a sign that the insurance industry is doing a good job in managing risks -- including a good job transferring catastrophe losses to reinsurers.
- Basic misunderstanding of the role of profits as a pricing mechanism in insurance markets due to the fact that effective insurance includes the capacity to withstand losses by transferring them to other agents -- something the public appreciates in the face of small disasters but misunderstands when insurers face large losses.



# Combined Ratio: Reinsurance vs. P/C Industry



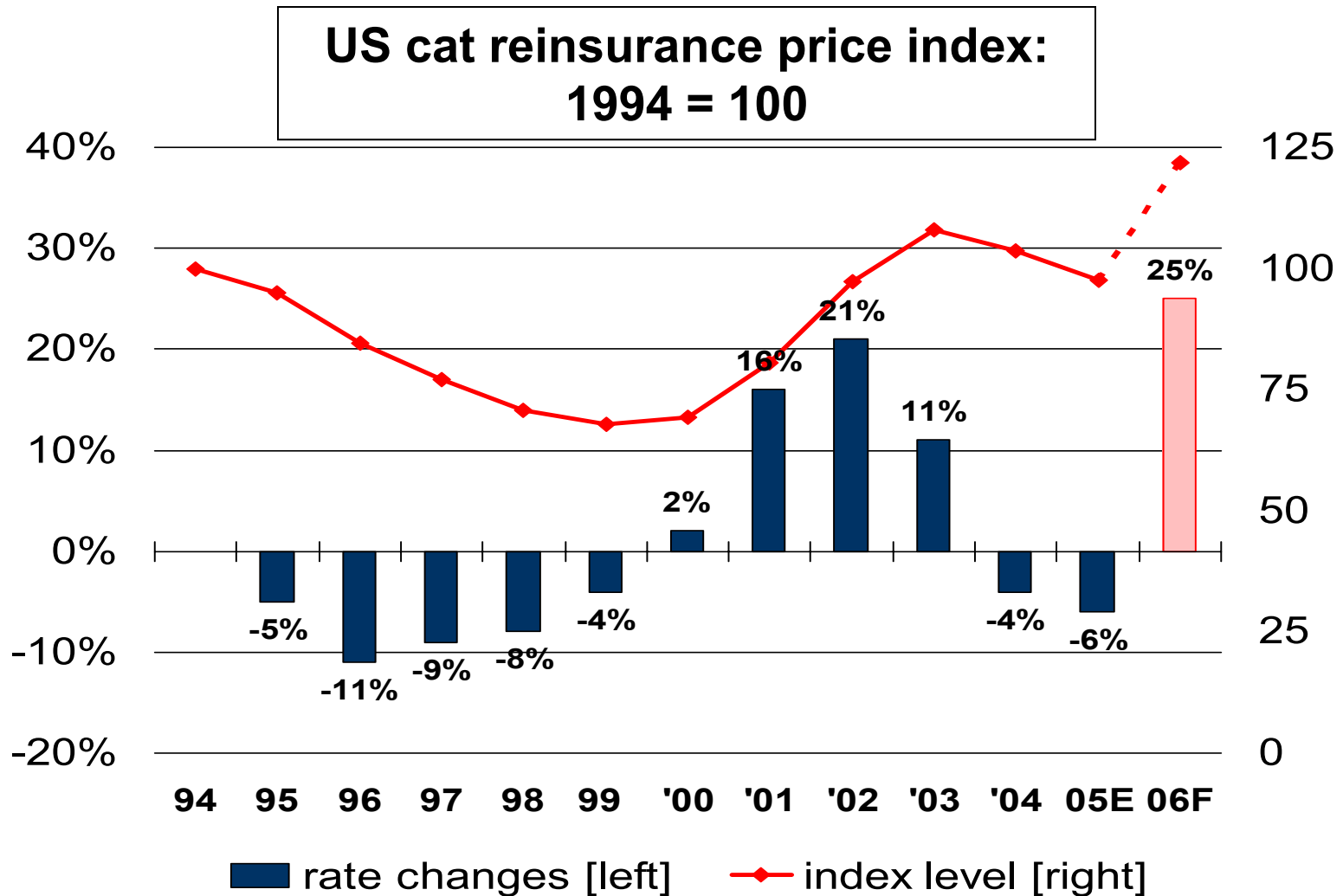


## Distribution of Katrina Losses by Market (\$Billions)

Market	Percentage	Amount
Insurers	47% - 53%	\$18.8 - \$28.9
Reinsurers	52% - 44%	\$20.7 - \$24.0
Capital Markets	1% - 3%	\$0.4 - \$1.6
<b>TOTAL</b>	<b>100%</b>	<b>\$39.9 - \$54.6</b>



# Reinsurance Prices Surged in 2006 Following Record CATs in 2005





- Competitive reinsurance markets enhance transparency in financial and risk management by evaluating the underwriting and claims activities of insurers (treaty reinsurance) as well as applying specialized knowledge to evaluation of catastrophic risks (facultative reinsurance).
- Competitive reinsurance markets enhance primary insurer capacity as well as putting downward pressure on rates by increasing the number and sophistication of insurers of all sizes and in all niches.

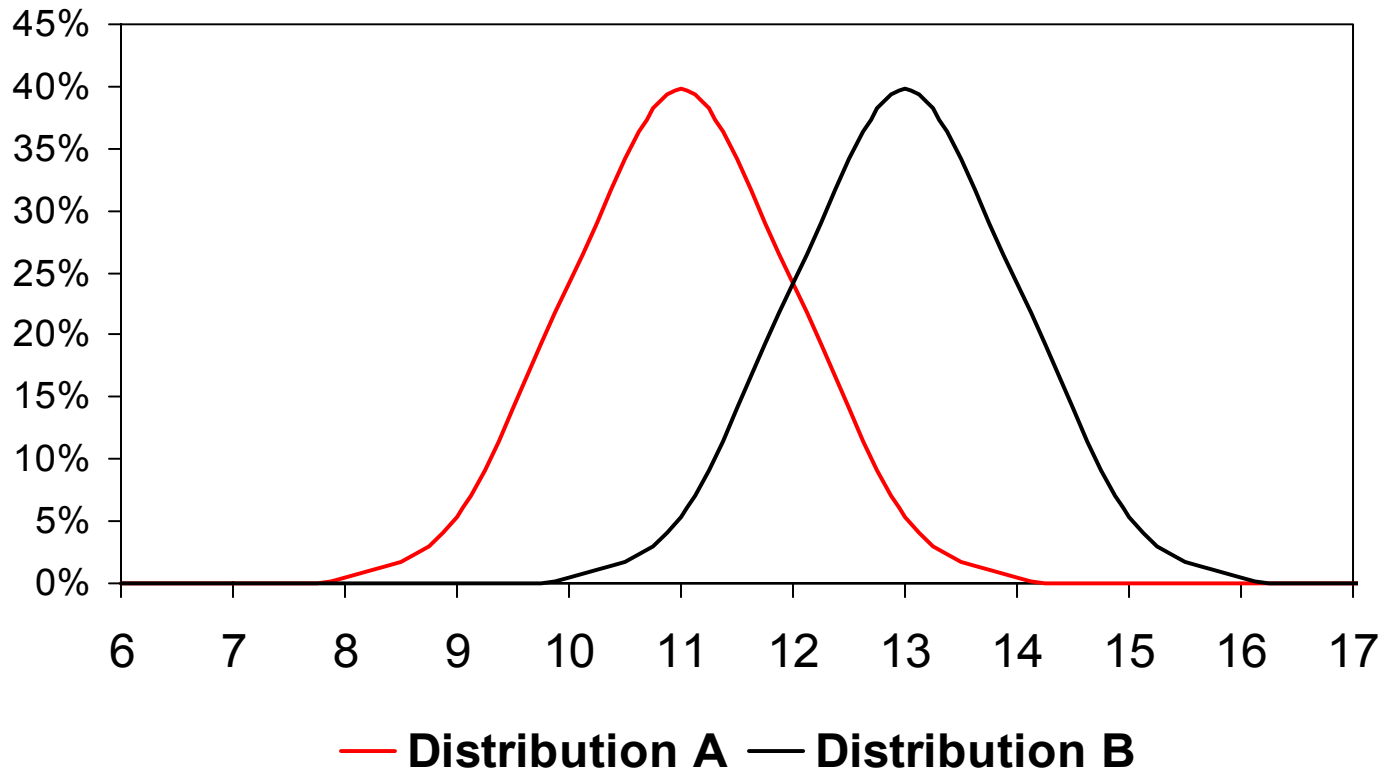


- Primary insurers: evaluation of loss exposures and correlations across lines by virtue of changing frequency of catastrophes with implications for demand for reinsurance.
- Reinsurers: preoccupied with portfolio of risks offered by primary insurers as well as scientific uncertainty of climate change.
- Primary insurers transfer “right tail risks” to reinsurers who are effectively charged with understanding and managing large losses.



# “Right Tail Risks” and Scientific Uncertainty

Right tail risk is the area under the loss distribution to the right of a specific number. Hence, the probability that losses exceed 13 is far greater under Distribution B than Distribution A. Reinsurers worry about the size and location of the right tail of loss distributions. *Scientific uncertainty means not knowing which distribution applies.*





- Conflict between primary insurers and reinsurers in the face of scientific uncertainty about climate change:
  - Primary insurers push right tail risks off onto reinsurers in face of climate risk, while reinsurers have powerful incentives to support growth of knowledge about climate risk as well as to put limits on reinsurance for catastrophic climate loss exposures.
  - Reinsurance is less affordable and available whether or not science can confidently predict more frequent and severe losses from climate change so long as the state of knowledge cannot reduce right tail risks.



- Basic microeconomics suggests that both primary insurance and reinsurance will be *and should be* more expensive, and perhaps less available, in the face of catastrophic climate risk, even in the face of “imperfect” information due to scientific uncertainty.
- The reallocation of global savings away from capital accumulation (growth) and toward capital protection (insurance) in the shadow of climate risk requires more expensive insurance, which in turn puts a break on development.
- *Insurance is at the heart of a trade-off between development and protection in a world of far larger and more frequent right tail risks. This is a new, and extremely difficult, chapter in insurance and public policy.*



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