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EMERGING ISSUES IN THE REINSURANCE INDUSTRY

A Weather & Climate Perspective

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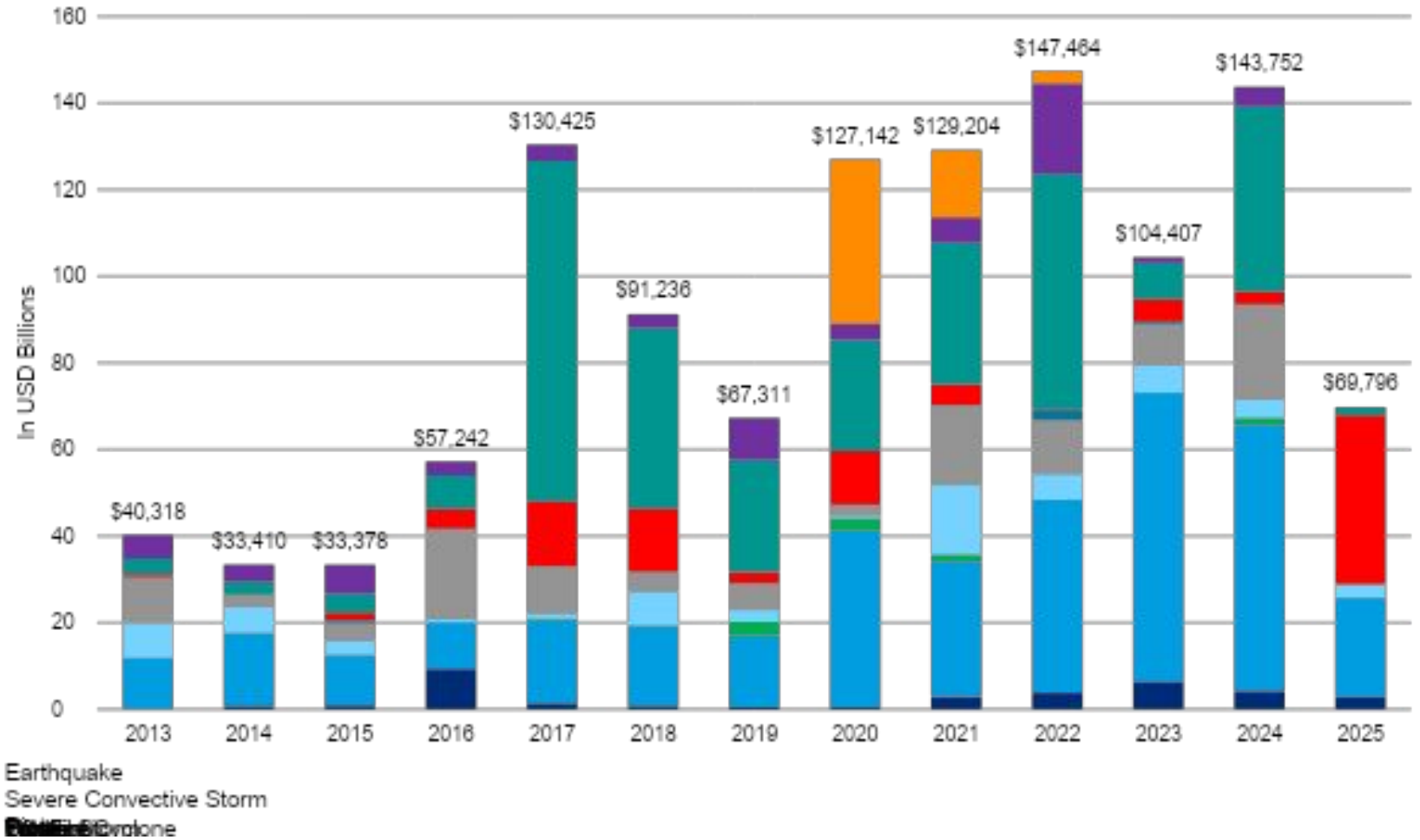
Significant Insured Losses To Q2 2025

Escalating insured losses over time, especially severe thunderstorm



*Significant Insured Losses (Insured Loss estimates >$100M), includes NFIP estimate. Figures are not adjusted for inflation.
Source: PCS, PERILS, ICA, GC, Floodsmart.org, and other news sources. Russia-Ukraine conflict losses estimated by S&P Global.
Data updated as of July 7, 2025

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- Total insured industry losses through Q2 2025 were **USD 70 billion**, after USD 144 billion in 2024.
- **California wildfire losses to date ~USD 40 billion.** Highest on record, and roughly 50% of all industry losses through Q2 2025.
- Additional losses included US severe convective storm (SCS), Cyclone Alfred in Australia, and the Myanmar/Thailand earthquake.
- **US SCS** accounts for ~28% of total losses through Q2 2025 – after roughly 40% in 2024.
- **Hurricane Helene: USD 14.6 billion**
  Hurricane Milton: USD 18.5 billion
- US hurricane accounted for roughly 30% of global insured losses in 2024
- **Event definitions, modeling capability, knowledge of what "normal" is and the state of the science are fundamentally different among each hazard, and have evolved with time.**

What Is Driving Loss Escalation?

Factors in the Global Insurance Marketplace

Inflation, Social or Otherwise

Supply Chain Disruption

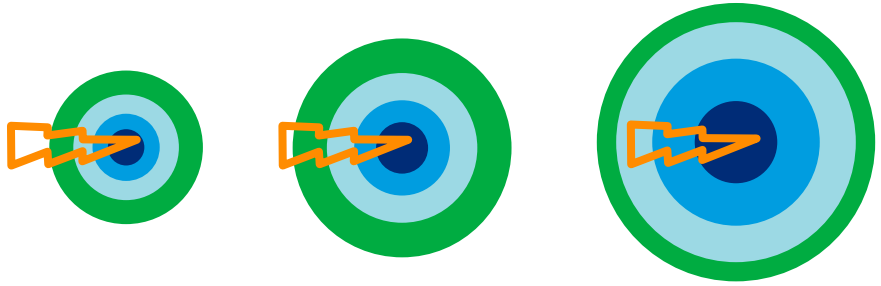
Monetary Policy

Claims Litigation

Widening Wealth Gap

COVID-19 Exacerbated All Factors

Population Growth



- **Urban**
- **Suburban**
- **Exurban**
- **Rural**

- Bullseye effect of population sprawl
- Footprint of severe thunderstorms, hurricanes, coastal flood, wildfire
- Expansion amplifies risk

Climate Change

Slow trends in the physical hazard affecting higher population areas

Our confidence in any trends, and state of the science, varies greatly from hazard to hazard (ie sea level rise and intense rainfall versus severe thunderstorm)

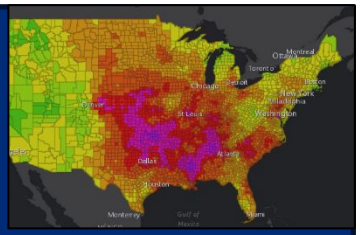
Optimizing Clarity in View of Risk

Different lenses to complement the essential role of catastrophe models

Claims Experience

Valuable context shorter return periods
Limited value for tails

Hazard Layers



Valuable for accumulation analysis by risk classification

Deterministic Scenarios

Assess peak concentrations with known events or ring analysis

Catastrophe Models

Physically plausible & unobserved events for tails, loss estimates

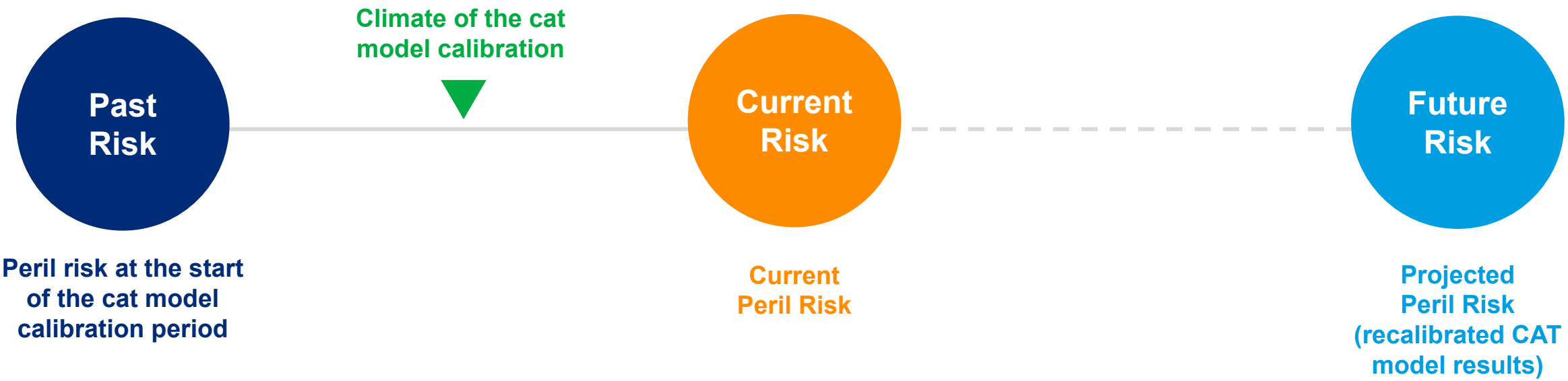
How Do Insurance Companies Estimate What "Normal" Is?

With difficulty

But…

Rough estimates are possible with **Catastrophe Models**

- CAT Models are a software tool to estimate what "normal" insured losses might be
- Relies on generation of millions of physically plausible and unobserved "events" (HU, FLD, WF etc.)
  - Coupled with damage characteristics on each event and on each site in a portfolio
  - Coupled with insured loss relative to value, deductible/policy terms, reinsurance contracts
  - To produce estimates of expected insured loss on an annual basis
  - "Average", "average of worst", "worst of worst"
- Used as a rough guide for pricing, risk selection, portfolio management with other tools…
- Calibrated to the best of view of science and engineering knowledge
- A model can only be so good as the science and engineering knowledge supporting it



What Datasets Are Essential for The Insurance Industry?

Scientifically defensible, independent frequency/severity views on {past : active : projected} hazards

Best view of current risk

- Scientifically defensible, vendor independent datasets informed by past events
- *Some* examples include HURDAT2, HURSAT, SPC datasets, basic station observations
- Reanalysis datasets for standard met variables but also severe weather parameters
- Use to create spatial hazard surfaces for portfolio analysis
- Informs synthetic datasets to reproduce physically plausible but unobserved events (cat models)
- Always treated as consistent with the scientific literature for best view of "normal"

Active events

- What happened, where, to what extent, and to what severity?
- SPC LSRs, NOAA damage assessment toolkit, hurricane ATCF, MODIS hotspots, weather analysis
- We use both raw and vendor upgraded datasets from NOAA

Best view of projected risk

- Use best view of the scientific literature, IPCC, NCA, and background datasets
- Rescale hazard maps and CAT models to account for known, scientifically defensible trends
- Trends have different meaning and confidence levels by peril (coastal flood, inland flood, hurricane intensity, hurricane frequency, severe thunderstorm, wildfire, winter storm)
- Our view of "normal" continues to evolve, and in some cases is still clarifying

Role of NOAA and the Research Community

- **Essential**…and…
- Formal & informal **dialogue** with **academic leads**
- Scientific depth varies with (re)insurance companies
- **NOAA Industry Proving Grounds** initiative can help with distilling data with greater accessibility
- NOAA **Coastal Hazards** & **Sea-Level Rise** tool suite are considered a **flagship offering** in the industry – actively used to assess changing risk in flood-prone areas using best available scientific view
- Vast **improvements** in **recent years**
  - data availability, quality, accessibility
  - Operational products (ATCF, MRMS, etc.)
  - Raw + value-add vendors
- **Further research developments**
  - ICECHIP project for hail characteristics
  - IBHS for engineering resilience
  - IPCC and NCA (and underlying research)
- We use these all as **essential reference points** to understand **present & projected views** of the physical hazards & **review active events**.

Enables viability of the insurance industry

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